Model AM1XT, AM1EXT and AM1T1
Extended Feature Bulk Call Generator

INSTRUCTION MANUAL

Ameritec
CORPORATION

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MODEL AM1XT,
AM1EXT AND AM1T1
EXTENDED FEATURE BULK CALL GENERATOR
INSTRUCTION MANUAL

Technical Data Subject to
Change Without Notice

July 1988

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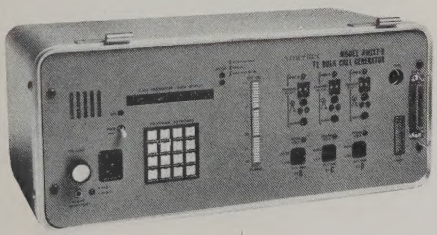
I INTRODUCTION

The Ameritec Model AM1XT Bulk Call Generator is a state-of-the-art call simulator. The AM1XT is actually a family of products which may be used in a variety of configurations to place a controlled "load" on a switching system. The various products which comprise an AM1XT system will allow for call generation and termination via loop start, ground start, 2 and 4 wire E&M, and digital T1 ports. The AM1XT also includes the capability of originating and terminating calls under Feature Group C and D, Equal Access, conditions. This means that The AM1XT may be used in both telco and inter-LATA environments for complete end-to-end testing of traffic originating and terminating at the different points. The AM1XT also includes two standard features which were previously optional in the earlier AM1 units. They are: Bothway Voicepath Confirmation, and Feature Expansion Package II options.

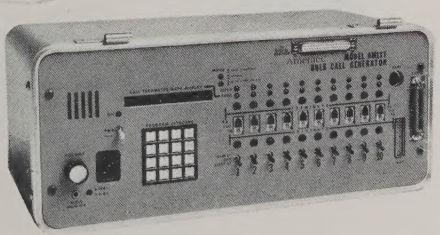
For purposes of this manual, an AM1XT "**unit**" configured with (or without) an AM1EXT Expansion "**unit**" and AM1T1 "**unit**" will be considered a "**set**". Multiple "**sets**" will be referred to as a "**system**". a "**system**" may consist of up to fifteen "**sets**".

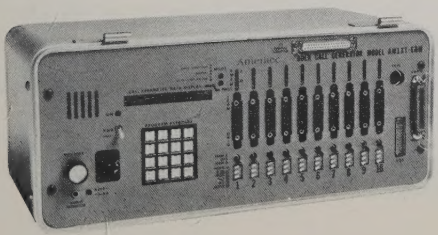
Each of the AM1XT and AM1EXT, including the AM1T1 adaptor units are shown below:



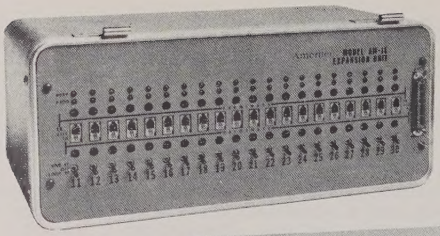
AM1XT-D11

AM1XT-111



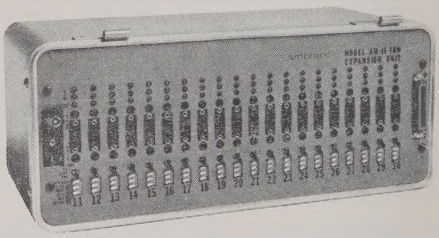


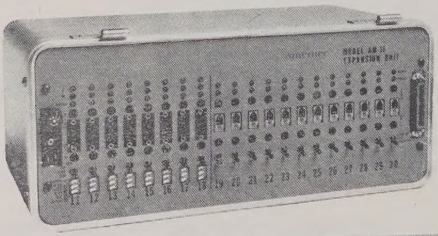
AM1XT-211



AM1EXT-11

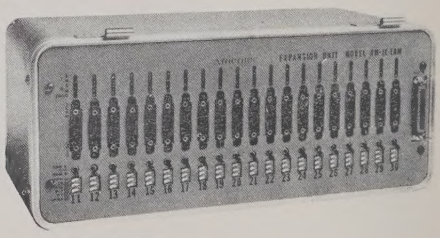
AM1EXT-21

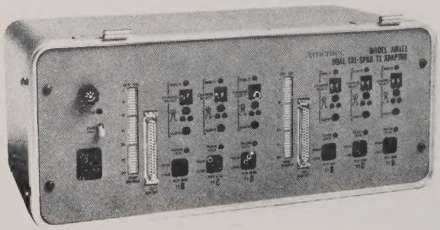




AM1EXT-31

AM1EXT-41





AM1T1-21

II INSTALLATION

A. NOMENCLATURE

The AM1XT family of units have unique numbering which indicates the type of ports, input power, and mounting configuration. These model numbers and nomenclature are listed below:

MODEL NUMBER	ORIGINATE/TERMINATE PORTS
AM1XT-1 _ _	10 loop start / ground start originate ports and 10 loop terminate ports.
AM1XT-2 _ _	10 2 or 4 wire E&M originate ports and 10 2 or 4 wire E&M terminate ports.
AM1XT-D _ _	Three T1 span lines for up to 30 originate and 30 terminate assignments.
AM1T1-1 _ _	Adaptor unit to either AM1XT-1 or AM1XT-2, above. Provides for Three T1 span line connections.
AM1T1-2 _ _	Adaptor unit to two AM1XT-1 and/or AM1XT-2 units.

NOTE: The blanks following the above model numbers indicate whether the unit is portable or rack mounted and the input power requirement.

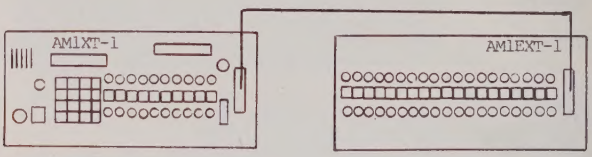
AM1EXT-1 _	Expansion unit to the AM1XT-1, -2, or -D. Equipped with 20 loop start / ground start originate and 20 loop terminate ports.
AM1EXT-2 _	Same as AM1EXT-1 but with 20 2 or 4 wire E&M originate and 20 loop terminate ports.
AM1EXT-3 _	Same as AM1EXT-1 but with 8 2 or 4 wire E&M and 12 loop start / ground start originate and 20 loop terminate ports.
AM1EXT-4 _	Same as AM1EXT-1 but with 20 2 or 4 wire E&M originate and 20 2 or 4 wire terminate ports.

NOTE: The blank following the above model numbers indicates whether the unit is portable or rack mount.

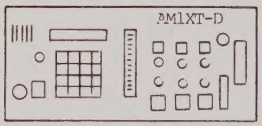
Regardless of the configuration using a single AM1XT and/or AM1EXT, with or without an AM1T1, the maximum call volume is based upon 30 originate and 30 terminate ports. Multiple AM1XT sets consisting of AM1XT units with or without AM1EXT and AM1T1 units may be "chained" for a system capacity of 450 originate and 450 terminate ports. In this large system configuration, all system commands and printouts may be achieved with one I/O device (i.e. printer, CRT, or Computer).

B. TYPICAL CONFIGURATIONS

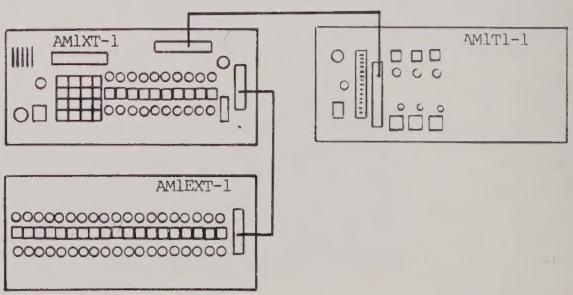
The following diagram depicts a typical 30 originate, 30 terminate line set that will generate approximately 10,000 to 15,000 calls per hour. This would normally be of sufficient size to adaquately "load" a PBX or C.O. of 500 to 1000 lines. Additional sets could be chained together to generate a greater load.



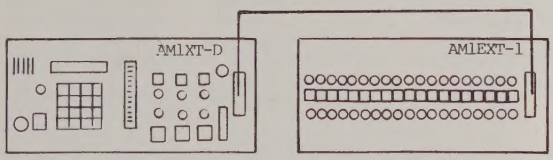
This diagram depicts a typical 30 originate, 30 terminate T1 trunk configuration that would generate approximate 6,000 to 12,000 calls per hour. This would be normally be of sufficient size to test a switch with up to 1500 trunks. Additional units would be chained together to accomodate larger switches.



This diagram depicts a typical 30 originate, 30 terminate configuration that is capable of generating approximately 6,000 to 12,000 calls per hour. The calls may be any combination of line to trunk, trunk to line, line to line, or trunk to trunk. Additional sets would be chained to produce greater calling volume.

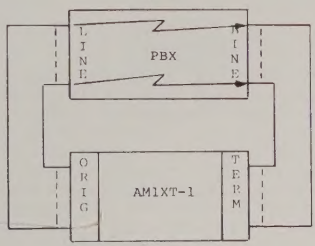


This is a different configuration for the same application as shown above. The difference is that the user is limited to 20 lines and 30 trunks. Therefore, only 20 line to trunk or trunk to line calls could be generated.

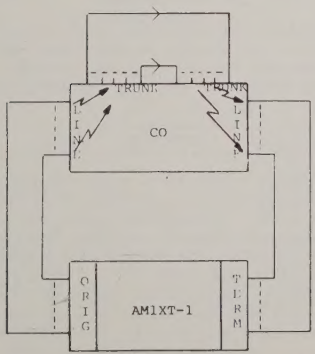


C. APPLICATIONS

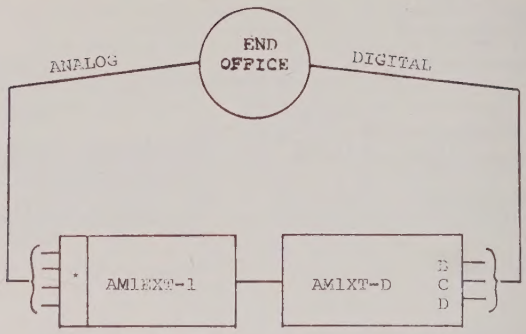
Shown below are some common applications:



PBX LINE-TO-LINE TESTING

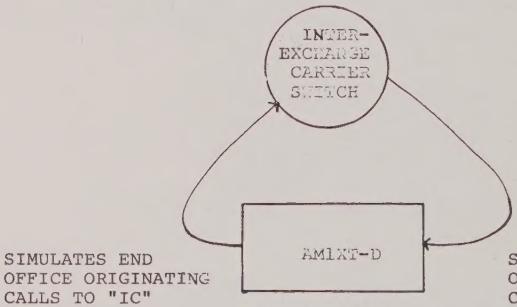


CENTRAL OFFICE LINE-TO-LINE TESTING



LINE-TO-TRUNK AND TRUNK-TO-LINE TESTING

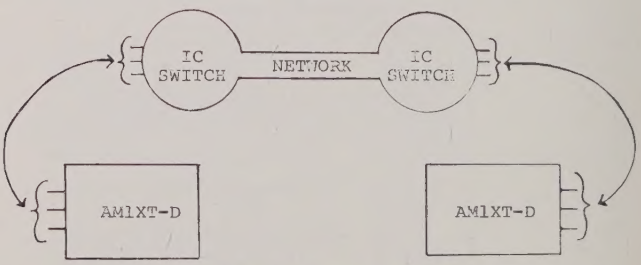
EQUAL ACCESS TESTING



SIMULATES END OFFICE ORIGINATING CALLS TO "IC"

SIMULATES END OFFICE TERMINATING CALLS FROM "IC"

EQUAL ACCESS TESTING



NETWORK TESTING

D. UNPACKING

The Unit was thoroughly tested and carefully packed before shipment and was in good condition when turned over to the carrier for shipment.
Upon receipt, thoroughly inspect the outside of the shipping container for damage and if damage is noted, immediately contact the carrier. The name of the carrier will be noted on the packing slip which is attached to the outside of the shipping container.

Open the container carefully and compare the contents with the packing slip.

Note any damage or shortages. Notify the carrier in the event of damage. Notify Ameritec in the event of shortage.

Save the shipping container for future use in the event that the unit may be returned to the factory.

E. POWER CONNECTION

The AM1XT Unit is supplied in one of three available power supply configurations:

115VAC 50/60HZ
220VAC 50/60HZ
-48VDC

The power supply configuration is noted on the power supply assembly and an appropriate power cord is supplied with the Unit. The power configuration is noted at the time of Unit order by indicating a unique model number. i.e. an AM1XT-131 is actually a portable AM1XT with loop start / ground start originate ports, loop terminate ports and -48VDC power. This is indicated by the digit "3" in the model number. A digit "1" in this location indicates 115VAC power and a digit "2" indicated 220VAC power. Regardless of source power selected, the AM1EXT-2 and -3 units require externally supplied -48VDC for signalling battery. **When the associated AM1XT used with the AM1EXT-2 and -3 is AC powered, the three prong AC cord supplied with the AM1XT must be used in a GROUNDED receptacle.**

Connect the Unit to the indicated power source. The power source should be a clean and stable source of the indicated voltage. Verify that the power source is not shared with motor driven machinery and that it will not be switched off unintentionally by other personnel.

F. MEMORY BATTERY

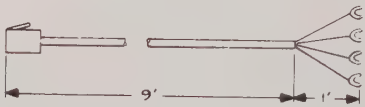
The AM1XT is equipped with a lithium battery, located on the CPU/MEMORY/RTC board P/N 280033, which provides for battery-backed memory in the event of power outages. This battery will provide a minimum of 500 hours of battery backed memory. The Unit should not be left in the "Power On" condition without power attached for an extended period of time. It also includes auto-restart circuitry which will cause the Unit to resume operation when power is returned. When equipped with either the 28-0005 or 28-0006 RS232 interfaces, a message will be output indicating the time and date of power loss and power return.

For battery replacement of Revision A boards (P/N 280033), the board should be removed from the Unit and returned to the factory. For Revision B, or later, the battery is socket mounted and may be replaced in the field by the user. Replacement battery number 88-0001 should be ordered when a replacement battery is needed.

G. TELEPHONE PORT CONNECTIONS

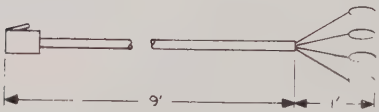
There are different telephone port connectors depending upon which of the various AM1XT Units is being used. The AM1XT-1 has modular connectors for each of the ten dual ports. This connector is the same type as found on standard telephone handsets, and is the four pin configuration. Connection to this connector may be made via individual line cords, part numbers 48-0004, 48-0005, or 48-0006. These are each ten foot cables with modular mating connectors on one end and open ended, minigator ended, and .045 sleeve ended on the other end, respectively. Another method is to use the 48-0018 which is a panel mount adaptor providing for a single 25 pair female connection for the ten dual ports. The 48-0004, 48-0005, and 48-0006 are shown below:

Model 48-0004



Spade Lugs

Model 48-0005



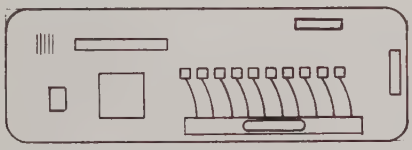
Minigator Clips

Model 48-0006

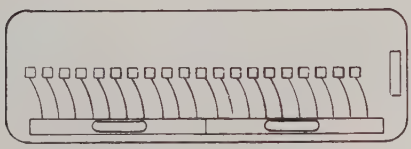
Metal Sleeve (for .045sq or .040 x .050 wire wrap pin.)

Part Number 48-0018 provides for a panel mounted adaptor which allows connection to a cable with a 50 pin female Amphenol type connector for connection to loop circuits.

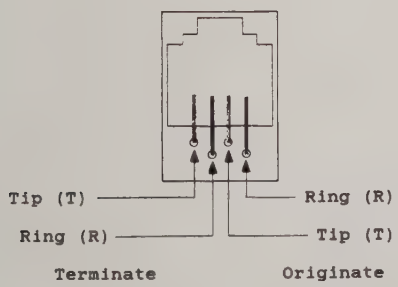
AM1XT-1



AM1EXT



The pin assignments for the modular connector, when viewed from the front panel, is shown below:



The AM1XT-1 simulates a conventional telephone set on both the originate line and the terminate line. It should be connected to the switch or machine under test as though there were two telepho..- sets.

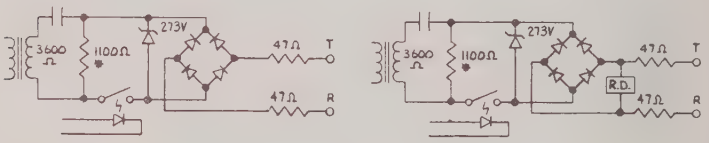
NOTE: 1200 ohms of loop resistance is simulated by the AM1XT. For this reason, the total loop resistance (i.e. the sum of

actual loop resistance plus the 1200 ohms simulated by the AM1XT) should not exceed the rated maximum loop resistance for the switch or failure to seize the loop, detect dial tone, or confirmation tone may occur.

Optionally, the loop resistance of the AM1XT can be factory set for 600 ohms. This is normally done when the AM1XT is to be used with 24 volt PBXs where the loop limits are typically 800 to 1000 ohms maximum.

The three position toggle switch on each dual port line card is covered with a rubber "boot". This boot color will identify the loop resistance. The boot color will be black if the loop resistance is 1200 ohms and blue if it is 600 ohms.

The AM1XT line circuit contains a diode bridge making it possible to connect the tip and ring without concern for polarity. The "Originate" and "Terminate" schematic circuits are as follows:



Originate Circuit (Loop Start)

Terminate Circuit

* 500 ohms when equipped for optional 600 ohms loop resistance.

Individual wire color coding for cables 48-0004, 48-0005, and 48-0006 is as follows:

WIRE COLOR	CONNECTION
Red	Tip (T) Originate Line
Black	Ring (R) " "
Yellow	Tip (T) Terminate Line
Green	Ring (R) " "

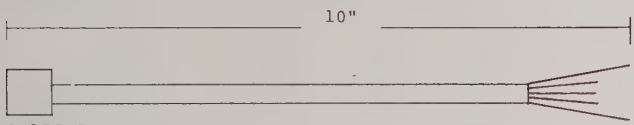
The pin assignment for the 48-0018 is as follows:

PIN NUMBER	CONNECTION
1 & 26	T & R Originate Line #1
2 & 27	T & R Terminate Line #1
3 & 28	T & R Originate Line #2
4 & 29	T & R Terminate Line #2
5 & 30	T & R Originate Line #3
6 & 31	T & R Terminate Line #3
7 & 32	T & R Originate Line #4
8 & 33	T & R Terminate Line #4
9 & 34	T & R Originate Line #5
10 & 35	T & R Terminate Line #5
11 & 36	T & R Originate Line #6
12 & 37	T & R Terminate Line #6
13 & 38	T & R Originate Line #7
14 & 39	T & R Terminate Line #7

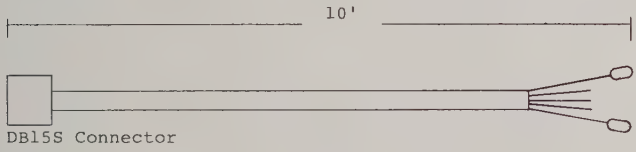
15 & 40	T & R Originate Line #8
16 & 41	T & R Terminate Line #8
17 & 42	T & R Originate Line #9
18 & 43	T & R Terminate Line #9
19 & 44	T & R Originate Line #10
20 & 45	T & R Terminate Line #10
21 & 46	No Connection
22 & 47	No Connection
23 & 48	No Connection
24 & 49	No Connection
25 & 50	No Connection

The AM1XT-2 has ten individual, 15 pin, D sub-miniature connectors for connection to both E&M originate and terminate ports. Cable numbers 48-0039, 48-0040, and 48-0041 are available for connection to the individual 15 pin connectors. They are ten feet in length with the opposite end being open ended, minigator ended, or .045 sleeve ended, respectively. The 48-0039, 48-0040, and 48-0041 cables are shown below:

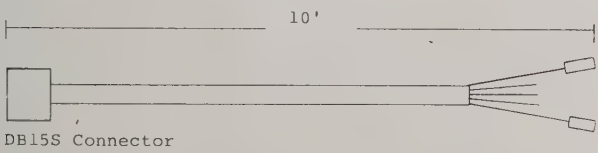
Cable #48-0039, Dual Line Cable (open end)



Cable #48-0040, Dual Line Cable (minigator end)



Cable #48-0041, Dual Line Cable (sleeve end)
(Fits .045 wire wrap posts found on most C.O. terminal blocks)

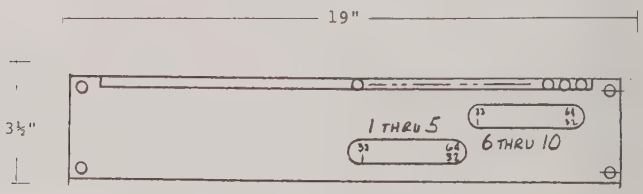


The 15 pin connector, pin assignments are as follows:

PIN	CABLE WIRE COLOR	CONNECTION
1	Brown	Ground
3	Orange	Tip - Originate
10	White	Ring - "
2	Red	Tip (1) - "
9	Slate	Ring (1)- "
4	Yellow	E - "
11	Red/Black	M - "
7	Violet	Tip - Terminate
14	Red/Yellow	Ring - "
8	Green	Tip (1) - "
15	Red/Green	Ring (1)- "
6	Blue	E - "
13	Tan	M - "

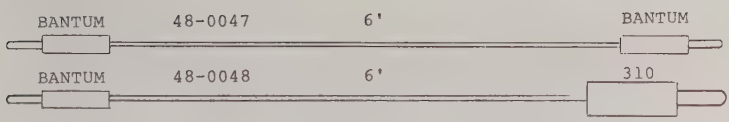
NOTE: **The "Ground" wire (Pin 1, Brown) of at least one dual port cable must be connected to "switch ground".**

A rack mount panel is also available for the AM1XT-2. Part number 36-0003, shown below, includes two 64 pin connectors and mounts in a 19" relay rack, occupying 3 1/2" of vertical rack space.



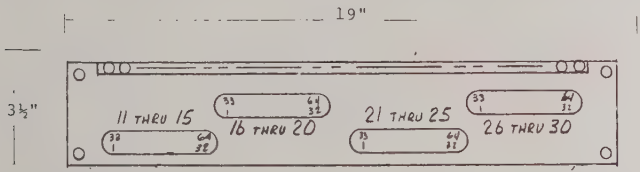
The AM1XT-D is equipped with three separate T1 ports. Each T1 port is equipped with dual Send and Receive "bantum" jacks labeled "LINE", "SND" and "RCV". These provide for the I/O connections to the DSX patch panel. Both Connections must be made to the "line" or "drop" (or equivalent) connections of the DSX patch panel. Generally, the connections are made to the drop side. This will cause the connection between the line and drop to be broken and for the AM1XT-D to be "loading" the local switch. The connections could be made to the line side wherein the "loading" of the T1 facilities and the remote switch will take place. Please note that when using the Unit in this manner, the distance to the first repeater should be no more than 500 feet. If the cables are connected in the proper manner, the yellow "Frame Lock" LED will be on when the unit is powered-up.

Cable number 48-0047 is a six foot bantum-to-bantum cable which may be used to interconnect the AM1XT-D to the switch patch panel if the panel is equipped with bantum jacks. Two cables are required for each T1 port. If the DSX, or equivalent, patch panel is equipped with 310 phone jacks, use cable number 48-0048. This is identical to the 48-0047 but with a 310 plug on one end and bantum on the other end. The 48-0047 and 48-0048 cables are shown below:

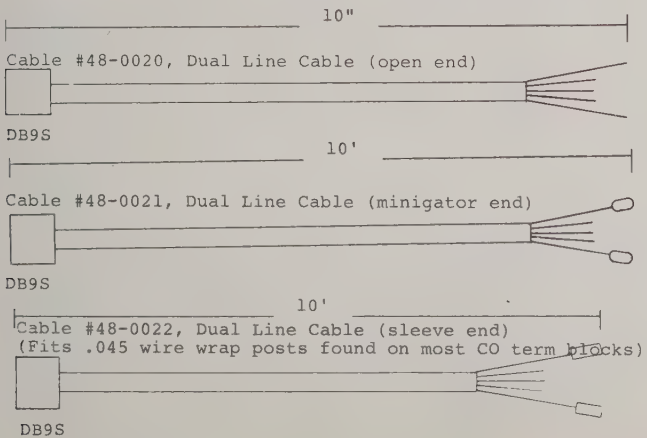


The AM1T1 units are identical to the AM1XT-D for input connection purposes.

The AM1EXT-1 and -4 units have the same port connectors as the AM1XT-1 and AM1XT-2 respectively. The AM1EXT units have 20 dual ports each. For rack mount AM1EXT-4 units, panel 36-0004 (shown below) may be used.



The AM1EXT-2 is an expansion unit to the AM1XT-1 or -2 that is equipped with 20 2 or 4 wire E&M originate and 20 loop terminate ports. Available cables for this unit are 48-0020, 48-0021, and 48-0022. These are each ten foot, dual port cables that are open ended, minigator ended, and .045 sleeve ended, respectively. The 48-0020, 48-0021, and 48-0022 cables are shown below:



Pin assignments for the nine pin, male connector for each port is as follows:

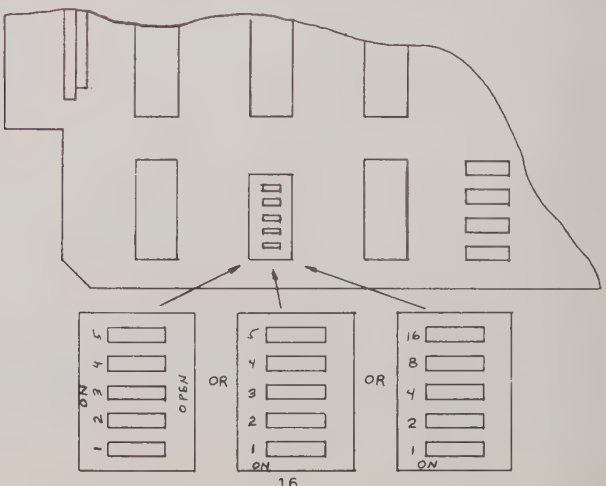
PIN	CABLE WIRE COLOR	FUNCTION T.E. MODE	S.W. MODE
1	Brown	Ground	Ground
3	Orange	T - Orig	T - Orig
7	Violet	R - "	R - "
2	Red	T(1) "	T(1) "
6	Blue	R(1) "	R(1) "
4	Yellow	E - "	M - "
8	Slate	M - "	E - "
5	Green	T - Term	T - Term
9	White	R - "	R - "

The AM1EXT-3 is a "split" unit that is equipped with eight dual port line cards as in the AM1EXT-2, and twelve of the dual port line cards as in the AM1EXT-1.

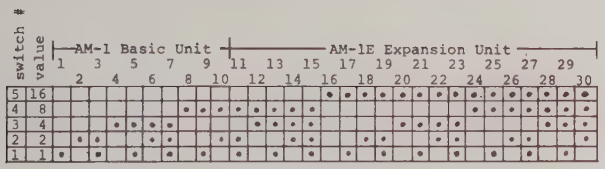
There is an "Expansion" cable included with each AM1EXT unit for connection to an AM1XT unit. There is also a cable included with the AM1T1 unit for connection to an AM1XT-1 or -2 unit (two cables are supplied with the AM1T1-2).

H. SETTING ADDRESS OF 2 PORT LINE CARDS

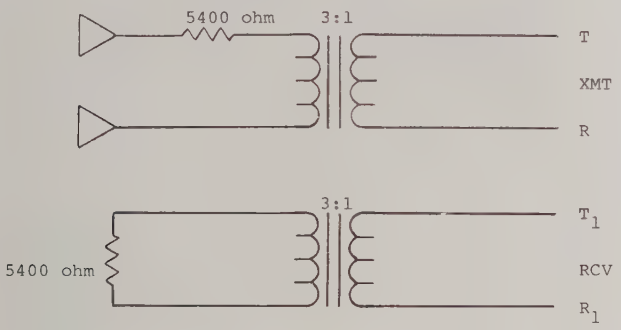
All AM1XT analog line cards have five position rocker switches for setting the card "address". Other than the address, the line cards for similar ports are identical to one another. The address programmed on the rocker switch must correspond to the line number of the card. For example, the card in Line 1 must be programmed for address 1, the card in line 15 must have address 15, etc.
The five position rocker switch is located in the lower left corner of the line card. Several types of five position rocker switches have been used in production, but all will contain five discrete switch actuation bars which will either operate as rocker switch bars or slide switch bars. The individual switches will be labeled from bottom to top as 1,2,3,4,5, or 1,2,4,8,16. The switch closed position will be labeled either "on" or "closed". The switch open position may be labeled either "off" or "open".



Set the switches in accordance with the following chart:



. indicates that the corresponding switch should be in the "on" or "closed" position. Note that the sum of the "value" of the "on" switches equal the card position number.



E & M TRANSMIT AND RECEIVE CIRCUITS

The figure above depicts the reflected impedance (600 ohms) for both the Transmit and Receive (T, R, and T1, R1) legs of each E&M line card.

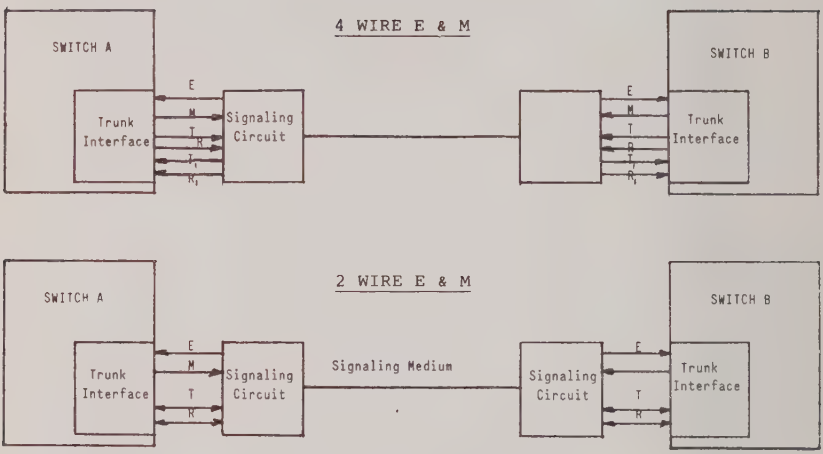
I. E & M TRUNK CONNECTIONS

1. Tutorial

"E" and "M" defines a signaling interface convention under which a switching machine may be connected to transmission equipment and visa versa.

A typical E & M Interface consists of two wires designated "E" and "M" over which DC signaling occurs (i.e. on hook/off hook signals and dial pulsing) and either one bi-directional pair (designated "T" and "R") or two uni-directional pairs (designated "T" and "R", and "T1" and "R1") over which voice band audio (voice and DTMF or MF signaling) is transmitted. These interface conventions are usually referred to as "2 wire" and "4 wire" E & M circuits respectively.

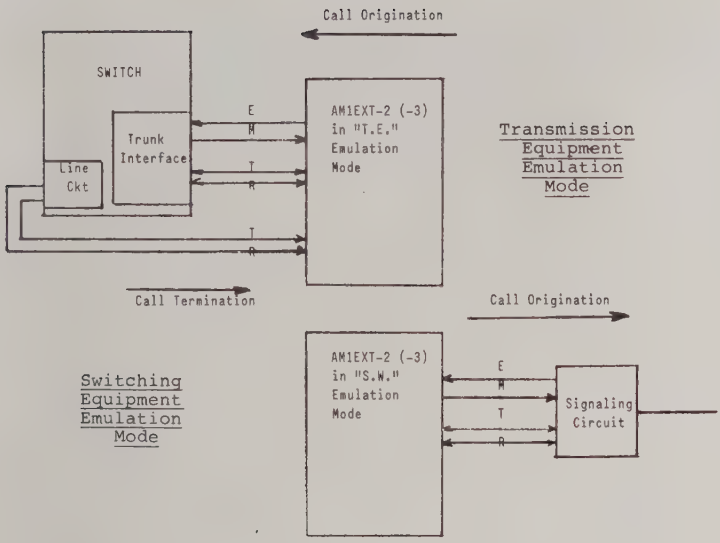
These circuits are illustrated below:



Switching Equipment (S.W.) Transmission Equipment (T.E.) Switching Equipment (S.W.)

2. E & M Emulation Modes

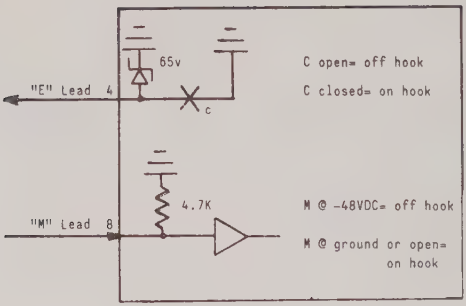
The Model AM1EXT-2 and -3 units are able to originate telephone traffic (telephone calls) into a 2 wire or 4 wire circuit emulating either switching equipment (SW) or transmission equipment (TE). These modes are illustrated below: **NOTE: The AM1XT terminate ports should not be connected to circuits that will be sent "dial pulses" by the switch under test.**



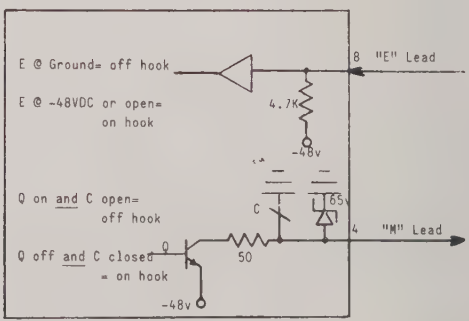
3. AM1EXT-2 and -3 (E&M) Equivalent Circuits

The "E" and "M" lead connections on the AM1EXT-2 and -3 (E&M) send or receive ground or -48VDC signals depending upon emulation mode and circuit status.

The AM1EXT-2 and -3 equivalent circuits are illustrated on the next page.



MODEL AM1EXT-2 (-3) IN "T.E." EMULATION MODE



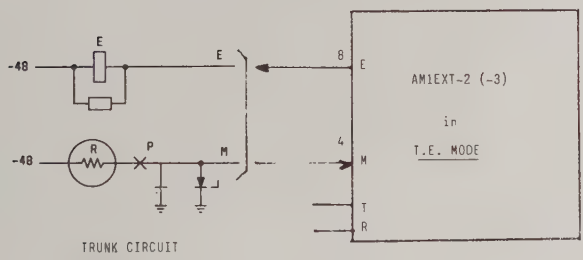
MODEL AM1EXT-2 (-3) IN "S.W." EMULATION MODE

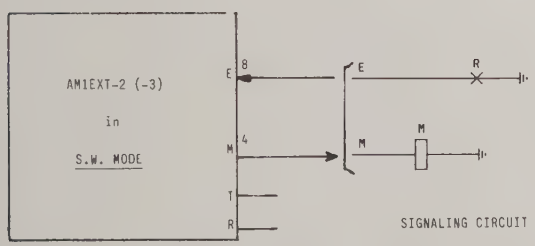
J. E & M TRUNK CONNECTIONS BY TRUNK TYPE

There are several different E & M trunk "types". These differ mainly in the way -48VDC and Ground are supplied to the E & M leads. The AM1XT Units are directly compatible with trunk "types" I, II, and III as defined in AT&T publication "Notes on the Network."* The Units are also compatible with trunk types IV and V by using an external relay circuit as described later in this manual.

Schematic representations of the five different trunk types in each of the two modes (transmission equipment emulation and switching equipment emulation) along with proper AM1EXT-2 & -3 connection are illustrated below:

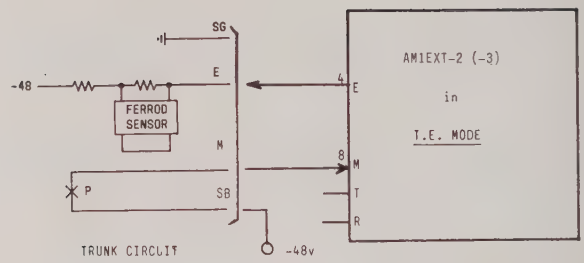
TYPE I E&M

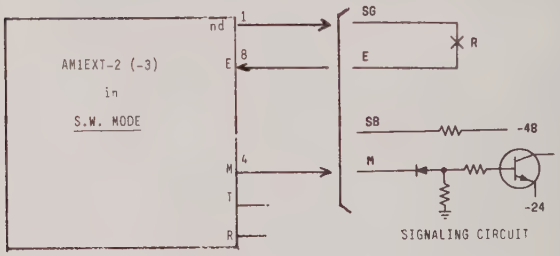




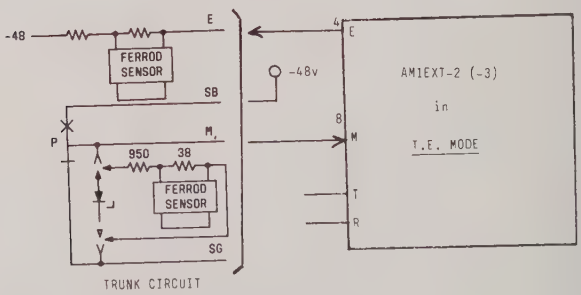
* Available from AT&T Information Distribution Center, Room C190, PO Box 3513, New Brunswick, NJ 08903.

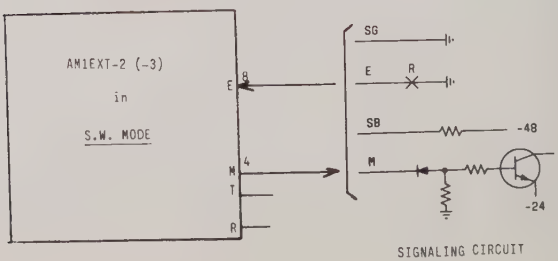
TYPE II E&M

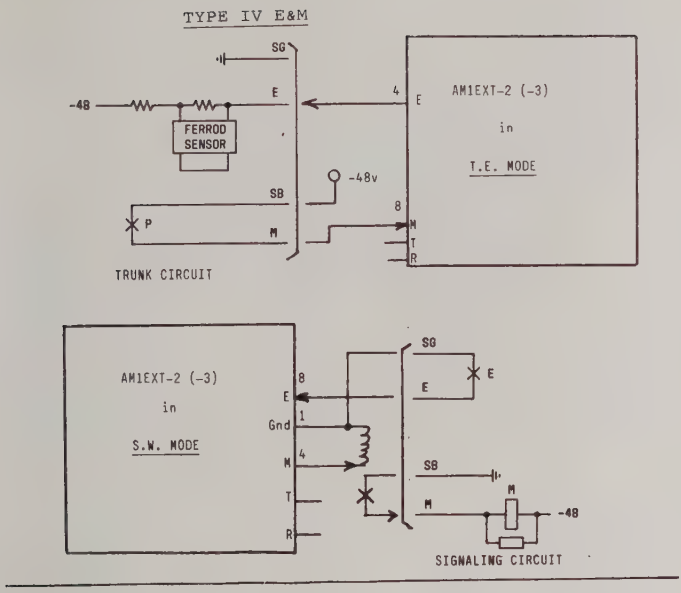




TYPE III E&M







The AM1XT-2 and AM1EXT-4 are identical to the AM1EXT-2 and -3 E & M cards with the exception that they also include E & M terminate ports rather than loop terminate ports. They also may only be used in the "TE" or Transmission Equipment mode.

K. E&M LINE CARD SWITCH SETTINGS FOR E&M/LOOP CARDS (AM1EXT-2)

1. Selection of Emulation Mode

There is a front panel three position toggle switch associated with each of the E&M/Loop port cards. The three switch positions are labeled "T.E.", "OFF", and "S.W." Their functions are as follows:

T.E.: Causes the E&M port to emulate transmission equipment originating calls into an E&M port of a switch.

S.W.: Causes the E&M port to emulate switching equipment originating calls into E&M transmission equipment.

OFF: Disables the originate port from going off-hook.

2. Selection of Call Initiation Method

There are four different types of call initiation methods; any one of which may be selected for each E&M port. The call initiation methods and their toggle switch positions are illustrated below:

METHOD	SWITCH POSITION
Immediate Start	
Delayed Start	
Dial Tone Start	
Wink Start	

The call initiation method is selected for each port by positioning two 2-position miniature toggle switches located below the port connector. Unit operation for each initiation method is as follows:

METHOD	EMULATE T.E.	EMULATE S.W.
Immediate Start	Ground applied to pin 4 (E). Dialling follows 500ms later	-48VDC applied to pin 8 (M). Dialling follows 500ms later.
Delayed Start	Ground applied to pin 4 (E). Dialling follows after "M" goes to ground.	-48VDC applied to pin 8 (M). Dialling follows after "E" goes to -48VDC.
Dial Tone Start	Ground applied to pin 4 (E). Dialling follows after DT is sensed on T & R (pins 3 & 7)	-48VDC applied to pin 8 (M). Dialling follows after DT is sensed on T & R (pins 3 & 7)

Wink Start	Ground applied to pin 4 (E). Dialling follows after "M" winks to -48VDC and back to ground.	-48VDC applied to pin 8 (M). Dialling follows after "E" winks to ground and back to -48VDC.

3. Selection of Send/Receive Gain

Send/Receive gain setting for the E&M "T" and "R" and "T1" and "R1" pairs may be selected separately for each E&M port by means of a single two position toggle switch associated with each port. The switch is located below the port connector and is labeled "0 DB" and "NORM".

Gain settings for each position are as follows:

SETTING	T/R *	T1/R1 *
0 DB	0 DB	0 DB
NORM (S.W. MODE)	-16 DB	+7 DB
NORM (T.E. MODE)	+7 DB	-16 DB

* The low band and high band programmable parameters for each line are off-set as noted i.e. if low, high DB is set at -06, -06 and switches are set at NORM (S.W. Mode), tones will be outpulsed at -22 DB.

L. E&M SWITCH SETTINGS FOR DUAL E&M CARDS (AM1XT-2, AM1EXT-4)

The "dip" switches for setting the output level and call initiation method for the Dual E&M cards are identical to the E&M/Loop card, described above. The dual E&M cards operate as if they are always in the T.E. Mode. This means that they are always "loading" the local switch.

The three position toggle switch associated with each E&M card need only be set to any position other than "OFF" for the originate port to generate traffic.

M. T1 (AM1XT-D AND AM1T1) UNITS

Both the AM1XT-D, Basic Unit, and the AM1T1, Adaptor Unit, provide the user with the ability of originating and terminating calls on DS1, 1.544 Mpbs, T1 trunks. There may be up to three, 24 channel, T1 span lines connected to any single set of units (multiple units may be "chained" together to achieve a maximum capacity of 45 span lines per system). As a practical matter, however, there is no limit of span lines per "system". This is because calls may be originating from one unit or system and terminating to the same unit or system, or to a totally unrelated unit or system. Each "set" of units may be programmed to originate calls on up to 30 channels or trunks, and terminate calls on a separate 30 channels or trunks. Any 60 of the possible 72 channels of the three span lines per set may be programmed as originate and terminate channels. **NOTE: The AM1XT terminate ports should not be connected to circuits that will be sent "dial pulses" by the switch under test.**

If the input cables are connected in the proper manner, the yellow Frame Lock LED will be on when the unit is powered-up. If the "Frame Lock" LED does not come on, the other LEDs associated with that span line are not representative of any particular state. A

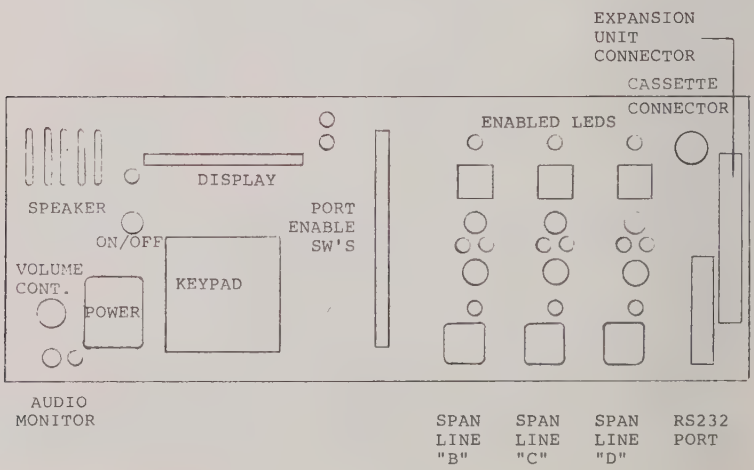
separate set of Send and Receive jacks are provided and are labeled "MON" "SND" and "RCV". These are wired in parallel to the "LINE" jacks and provide a means of connecting separate equipment.

In addition to the input connections for each of the three span lines, there are two additional bantum jacks. One is labeled "Audio" and is for patching to the Audio Monitor jack for audio monitoring of any selected channel of any span line. The other is directly above the E&M LEDs. This jack would be used to monitor with an oscilloscope or strip chart recorder, the representative E&M leads. The E&M LEDs are representative of the signalling bits in the T1 bit stream.

The green "ENBL'D" LED will indicates, when on, that the selected channel has been programmed as either an originate port or terminate port.

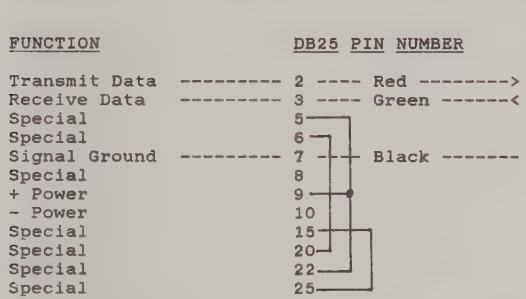
In the case of the AM1T1-1 unit, the connection is made via the supplied 37 pin cable to the associated AM1XT-1 or -2 unit. An expansion unit may also be connected to the AM1XT unit if desired. The AM1T1-2 unit is essentially the equivalent to two AM1T1-1 units in a single package and is used in conjunction with two separate AM1XT-1 or -2 units.

Shown below is a diagram of the front panel for the AM1XT-D.



N. RS232 AND CASSETTE CONNECTION

Each AM1XT unit may be equipped with option 28-0006, RS232 Interface, or 28-0005, RS232 and Cassette Interface. The RS232 connector is a 25 pin, male. It is compatible with most Serial ASCII teleprinters, CRTs, and modems. Certain pins of this connector must be strapped together for proper Unit operation. In addition, the printer, or DTE, may have its own unique strapping requirements. Ameritec Universal Printer Cable P/N 48-0012 (illustrated below) is suitable for this purpose.



NOTE: Pins 5, 9, and 22 must be connected to each other or the synchronous mode of operation will be disabled.

If the 28-0005 option is installed, there is an additional connector available. This is a circular DIN connector which is used for connection to the model 24-0002, Cassette Recorder. A cable is included with each Cassette Recorder for connection to this connector.

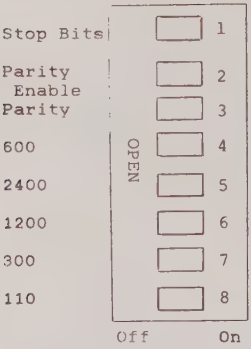
O. RS232 PORT BAUD RATE / PARITY SELECTION

When using this port, the appropriate baud rate, the number of stop bits (1 or 2), and parity (even, odd, yes/no) must be pre-selected on the RS232 Interface. This is accomplished by means of an eight position "dip" switch located on the RS232 Interface.

In order to gain access to the interface board, it is necessary to remove the AM1XT front panel. This is easily accomplished by:

1. Remove power cord.
2. Remove port connections.
3. Remove volume knob.
4. Remove four front panel retaining screws.
5. Remove front panel.
6. Unplug RS232 Interface board.

Set switches as follows:



On = 1, Off = 2

On = Parity Enabled, Off = Disabled

On = Odd, Off = Even

Select one "on" position only for desired baud rate.

Unless otherwise specified, the "normal" factory switch settings are:

2 Stop Bits
Even Parity
300 Baud

III OPERATION

The AM1XT-1, -2, and -D are all considered "Basic" units. These units include common control, keyboard, display, and RS232 functions. The AM1EXT-1, -2, -3, and -4 are all considered "expansion" units and may be used in any mix-and-match configuration with the basic units. Only one expansion unit may be used with any one basic unit at a time. In addition, the AM1Ti-1 and -2 units are "adaptor" units which may be connected to the AM1XT-1 or -2 units.

The maximum number of programmed originate ports per configuration is 30. The maximum number of terminate ports per configuration is also 30. Multiple sets may be "chained", however, to accommodate up to 450 programmed originate and 450 terminate ports. These units may also be physically "stacked" to minimize the amount of floor space required.

A. PRIMARY AND SECONDARY FUNCTIONS

The keypad is printed with black and red type. The black type represents Primary Functions and the red represents Secondary Functions.

NOTE: To execute a primary function, simply depress that key. To execute a secondary function, first depress the "Shift" key and then the desired secondary function key.

The Primary Functions are:

KEY	FUNCTION
1	Digit 1
2	" 2
3	" 3
4	" 4
5	" 5
6	" 6
7	" 7
8	" 8
9	" 9
0	" 0
* (KP)	" *
# (ST)	" #
SEL LINE	Select line for display or prog.
ETR/STP PARAM	Enters data and steps to next parameter
ENTER/STP LINE	Enters data and steps to next line.
SHIFT	Enables secondary function on the next key to be depressed.

The Secondary Functions are:

KEY	FUNCTION
ESCAPE	Used in the dialed number sequence to allow for temporary escape from the dialed number to look for confirmation tone as programmed by the "conf tone" parameter

(paired mode) or "O-T" parameter (unpaired mode). Denoted by the character "E" in the dialed number field.

FINISH — Stop all lines at completion of the calls in progress. "Unpaired" terminate ports will answer calls in the "Finish" mode. "Paired" terminate ports will not answer in this mode.

---> — Moves display cursor to the right.

MODE — Step to next mode (Manual, Auto Continue, Auto Stop on Trouble). Displays SYNC/RANDOM prompt.

COPY — Copies line parameters from one selected line to another. (Orig Port, Term Port, Dialed Number, O-T Tone, Start Delay, and all Data Registers are not copied.

SPCL — Depression of this key followed by a digit and executing (Etr Stp Param) will cause the following:

"1" — Print parameters and data associated with previously selected line "XX".

"2" — Print parameters and data associated with all lines.

"3" — Print data only associated with all lines.

"4" — Clear all data registers (re-set to zero).

"5" — Clears data registers associated with previously selected line "XX".

"6" — Read parameter data from tape unit into memory.

"7" — Dump parameter data from memory to tape.

"8" — Enable real time error reporting

"9" — Disable real time error reporting

"A" — Enables Automatic Data Readout

"B" — Disables Automatic Data Readout

"C" — Opens Alarm Contacts (only if unit is equipped with alarm option P/N 25-0011)

"D" — Set/observe clock

START	Starts the auto calling sequence if in auto mode or initiates the next event in the call sequence if in manual mode. Also used to continue from auto-stop on trouble.
FLASH	This function is inserted into the dialed number sequence to cause a momentary on-hook wherever it is inserted. Denoted by the character "F" in the dialed number field.
STOP	Stops the auto calling sequence. Terminate ports will not answer when the unit is "stopped".
NEG (-) WAIT	Used to enter a negative value when programming touch tone or MF frequency offset or to insert a 3 second "WAIT" into the dialed number sequence. May also be used as the first character in the dialed number sequence to override the initial automatic pause for dial tone or wink. Denoted by the character "-" in the dialed number field.
BLANK	Enter "blank" for digit in telephone number. **NOTE: Dialing is terminated at the first blank in the telephone number.**
PAUSE	This function is inserted into the dialed number sequence to cause the unit to wait for 2nd dial tone, 3rd, etc... wherever it is inserted. Denoted by the letter "P" in the dialed number field. There is an assumed "P" at the start of an analog originate port's dialed number field. On T1 originage ports, the assumed start signal is a "wink". If your T1 originate port is dial tone start, insert a "P" as the first digit dialed.
A	Digit A
B	Digit B
C	Digit C
D	Digit D

The multiple Secondary Functions are:

EE (Escape, Escape)	Two "E"s together in the dialed number sequence cause that line to stop dialling and wait for 1000Hz tone.
EA (Escape, A)	An "E" followed by an "A" in the dialed number sequence will cause that line to stop dialling and unbalance the line by placing a ground on the "Ring" for 500ms.

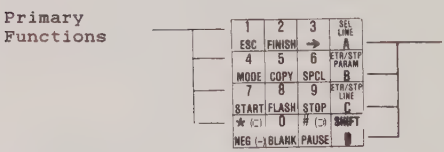
EB
(Escape, B)

An "E" followed by a "B" in the dialed number sequence will cause the dialling to "toggle" to the next mode (TT, DP, MF, DMF, TT, ...) **NOTE: Digital Multi-Frequency, does not appear in the prompt for each line's dialling mode question, however, must be accounted for when using the "EB", toggle feature. Therefore, when toggling from "MF" to "TT", "EBEB" must be entered.**

EC
(Escape, C)

An "E" followed by a "C" in the dialed number sequence will cause that line to stop dialling and wait for a "wink" of 100ms minimum duration (used for E&M or T1 ports only).

KEYPAD LAYOUT


Primary Functions
1 2 3 SEL LINE A
ESC FINISH →
4 5 6 ETR/STP PARAM B
MODE COPY SPCL
7 8 9 ETR/STP LINE C
START FLASH STOP
★ (C) 0 # (D) SHIFT
NEG (-) BLANK PAUSE
Secondary Functions

B. SET UP

If using either the expansion unit or adaptor unit with an AM1XT basic unit, first connect the expansion and/or adaptor cables to the basic unit. Then connect the power cord to the appropriate supply source. At this time, the telephone port connections should be made.

First turn the **power** switch of **the T1 adaptor unit**, if used, and **then the basic unit** to the "ON" position.

NOTE: **Always turn the power switch "OFF" when not using the unit. Failure to do so will result in discharge of the lithium battery used for memory back-up.**

C. PARAMETER ENTRY AND REVIEW

Upon power initialization, the 16 character LED display will first show the clock. At this time, use the keyboard to enter the time, month, day, and year. Use 24 hour time i.e. 2 PM is 1400. When the correct time is entered, enter the data by depressing the "B" button. By doing this, two things took place; one was that the clock data was entered into memory. The other was that the display stepped to the first memory location for the unit.

NOTE: **To display or reset the clock after the unit is running, use Special Function "D" (Shift, 6, D, ETR).**

The first memory location is the line number, "LINE 01". There are 30 of these locations (Line 01 through Line 30). By depressing the "B" button once again, the display will show "ORIG PORT 01", the first actual parameter if T1 ports are part of the configura-

tion. If there are only analog ports in the configuration, the first parameter will be the telephone number for line 1.

Below, is a step-by-step listing of the parameters that will be encountered if the "B" (ENTER / STEP PARAMETER) button is depressed at each of the parameters. Depressing the "B" button is actually executing the "ENTER / STEP PARAMETER" function. If the "C" button, or "ENTER / STEP LINE" button is depressed, the parameter is entered and the display moves to the same parameter of the next line.

PARAMETER	DEFAULT	DESCRIPTION
CLOC	0000-010100	The clock is displayed at initial power-up and after power failure. The entry should be in 24 hour time, month, day, and year.
LINE	01	This is the first of 30 unique locations for specifying and controling originating and terminating ports.
ORIG PORT	A01	This parameter identifies the location of the originate port. "A01" indicates that the call for this memory location will be originated from the analog originate port designated as "01". If a T1 port is desired, the entry should changed to read the appropriate span line (B, C, or D) and the digits 01-24. Allowable entries are the default or any of the B, C, or D 01-24 values. This parameter appears only if there is an AM1T1 or AM1XT-D being used in the set.
TERM PORT	A01	This parameter identifies the location of the terminate port. "A01" indicates that the call for this memory location will be terminated to the analog terminate port designated as "01". If a T1 port is desired, the entry should be changed to read the appropriate span (B, C, or D) and the digits 01-24. Allowable entries include the default value and any of the T1 (B, C, D 01-24) values. This parameter appears only if there is an AM1T1 or AM1XT-D being used in the set.

NOTE: The terminate port entered doesn't have to be the specific terminate port where the originated call will terminate. When a given line's originate port does terminate to the same line's programmed terminate port, it is referred to as "paired" operation. If the call will terminate to a location other than a known specific port, "unpaired" operation will be specified at a parameter below. If paired operation is possible, a bothway voicepath confirmation check can be made. If unpaired operation is necessary, such as terminating to a trunk of a trunk group, only one way (terminate to originate) voicepath confirmation can be made. If, however, an analog port is designated as an unpaired terminate port, no voicepath confirmation can be made.

..... This is a blank field for entry of the dialed number, as it relates to the originate port. Any of the digits 0-9, A, B, C, D, #, *, KP, and ST plus the following special digits are allowed:

"P" PAUSE for dial tone

"F" Generate hook FLASH

"D" Generates DTMF "D" digit, or, if used as first digit of T1 port, will cause that port to delay start dial until "M" lead drops. The "D" is not outpulsed when used as the first digit.

"-" 3 second WAIT in dialling (used also as first digit for "Immediate" start dial circuits).

"E" (ESCape) Stop dialling and confirm as programmed by the confirmation tone parameter (paired mode) or "O-T" parameter (unpaired mode)

"EE" (ESCape, ESCape) Stop dialling and confirm using external 1000HZ

"EA" (ESCape, A) Unbalance the line for 500ms (Ground on "Ring" lead).

"EB" (ESCape, B) Toggle to the next dialling mode (TT, DP, MF, DMF, TT, ...) **NOTE: The digit "4", Digital Multi-Frequency, does not appear in the prompt for each line, however, must be accounted for when using the "EB", toggle feature. Therefore, when toggling from "MF" to "TT", "EBEB" must be entered.**

"EC" (ESCape, C) Pause for a wink

NOTE: Up to 48 digits (three sets of 16) may be programmed in this field. If more than 16 digits are used, enter the first 16, then depress the ETR/STP PARAM button to display the second blank field. Repeat for the third field if necessary.

NOTE: When a T1 time slot is programmed as the originate port, a "wink" of $\geq$ 100ms and $\leq$ 1500ms is required before the dialed digits are outpulsed. If an initial "wink" is in excess of 1500 ms, the port will begin outpulsing of the dialed digits without waiting for the end of the wink. This may be over-ridden by entering either a "-" (wait) for

immediate dial (actually there will be a three second delay from seizure to dial), or "P" (Pause) for dial tone start circuits as the first dialed digit, or "D" (Delay) for delay dial circuits. When an analog "loop" port is programmed as the originate port, there is an assumed "P" or pause for dial tone before start of dialling. This may also be over-ridden by inserting a "-" as the first dialed digit. When an analog "E&M" port is programmed as the originate port, the "dip" switches associated with that card should be used to identify the type of start signal expected (dial tone, wink, immediate, and delayed) and program the first digit to be dialed in the first location of the display). The use of the "D" as the first digit to be compatible with delay dial circuits only applies to T1 originate ports.

DT DELAY	03	Dial Tone Delay Threshold: This is the time, in seconds, from off-hook, within which "start dial" (typically Dial Tone, but may be a "Wink" or end of a "Delay" for E&M or T1) is expected (unless a "-" is programmed as the first digit). The AM1XT will wait for 15 seconds from off-hook until the programmed start dial signal is received before aborting the call. If start dial is received after the DT DELAY, but, before the 15 second timeout, the DT DELAY data register will be incremented by one. This register will be incremented a maximum of one time per attempt regardless of the number of delays encountered. Allowable entries are 01 to 15 seconds in one second steps.
PR=1 UNPR=2	1	Paired or Unpaired Operation: Paired operation is where the dialed number outpulsed from an originate port will cause a specific terminate port (of the same AM1XT set) to receive a call. Unpaired operation is where originate port dialling will result in termination at any of a number of terminate ports, whether a port of the same AM1XT set or not. Even calls to points separate from AM1XTs may be made, i.e. to milliwatt sources. If paired operation is chosen, the above programmed originate port should always call the above programmed terminate port. If unpaired operation is chosen, the above programmed originate and terminate ports are totally independent. This means that the programmed terminate port is simply a possible terminate location for calls originated someplace, not necessarily from this line's originate port or from this AM1XT. Allowable entries are "1" or "2". Unpaired operation should always terminate to T1 ports for best (and understandable) results (see note below).

NOTE: For unpaired T1 terminate ports, a confirmation of voicepath may be made (by using O-T tones 0-9 or A-C discussed below). The T1 terminate port will continue sending the programmed tone until the switch releases its equivalent "M" lead. If an unpaired analog terminate port is selected, however, only the entry "D" (Quiet) is allowable and no confirmation of voicepath can be made. This mode of operation is not recommended due to its complexity in assuring the coordination of parameters and determining whether or not the switch actually made a connection and when. If terminating to analog ports is desired, however, please note the following points. The O-T tone must be "D", or quiet ("D" is actually a "don't care" condition, wherein it doesn't matter if there is tone or not). The E&M terminate line will be held until the switch releases its "M" lead. The loop terminate line will answer only if a "Delay 1" is programmed. The time from ring detect to answer is the value of "Delay 1". "Delay 2" is the amount of time that the line will remain off-hook. The "Wink 1" time is immaterial other than the fact that it must be something other than "0" just to be prompted with "2 DELAY-WINK". In addition, the "DELAY-WINK" prompts only appear if the programmed terminate port is either a T1 or E&M port. Therefore, program the terminate port to be one of the T1 (B, C, or D) spans to display these prompts. After programming the Delays and Wink, reprogram the terminate port to the "A" (analog) port. In any case, do not terminate to the loop side of a E&M orig / loop terminate line card such as those used in the AM1EXT-2 and -3 units.

CONF TONE 12

Voicepath Confirmation Tone Frequency and Direction: This parameter appears only if paired operation, above, is selected. The first (tens) digit indicates which of eight tones is desired for making a voicepath confirmation check for this pair of ports. Digits "1" through "8" represent frequencies ranging from 697HZ to 1633HZ. The second (units) digit indicates whether the voicepath check is to be "one way" (terminate to originate) or "two way". A "1" means one way, a "2" means bothway. Allowable entries are from 1 to 8 (tens digit) and 1 or 2 (units digit). The frequencies and their respective digits are shown below:

CODE	FREQUENCY
1	697 HZ
2	770 HZ
3	852 HZ
4	941 HZ
5	1209 HZ
6	1336 HZ
7	1477 HZ
8	1633 HZ

O-T TONE O-D

Expected Originate and Generated Terminate Tones: The "O-T" tone parameter appears only if unpaired operation is selected for this line. In this case, the operator is

given the opportunity of selecting different tones expected by the programmed "Originate" port for this line, and sent from the programmed "Terminate" port for this line. These digits should be matched for originating calls expected to land in specific trunk groups. There are 13 different tones which may be programmed (0-9 and A-C) representing 13 different trunk groups per AM1XT. These 13 tones apply only when using T1 ports. In addition, there is a special digit, "D" which indicates a "no" check. **The "D"must be used if the terminate port is analog.** Use digit "0" as the "O" tone when terminating to a 1000HZ source in the unpaired mode. **when operating in the Unpaired mode, only one way voicepath checks can be made.** The frequencies and their respective digits are shown below:

CODE	FREQUENCY
0	1025 HZ
1	1150 HZ
2	1275 HZ
3	1400 HZ
4	1525 HZ
5	1650 HZ
6	1775 HZ
7	1900 HZ
8	2025 HZ
9	2150 HZ
A	2275 HZ
B	2400 HZ
C	900 HZ
D	QUIET (DON'T CARE)

NOTE: **In some switch installations, an incompleted call will cause the originated call to be routed to a recording. Associated with some of these recordings are a series of tones called Special Information Tones (SIT). The frequencies used for these tones any of the following: 913.8HZ, 985.2HZ, 1370.6HZ, 1428.5HZ, 1776.7HZ. Due to the possibility of these SIT tones potentially causing the call to appear as completed (i.e. confirming tone received) in these environments, do not use the following "O-T" tone codes: 0, 3, 6, C.**

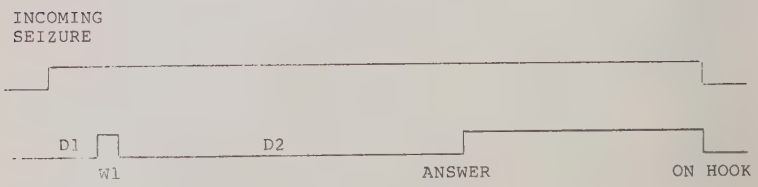
SUP CH 1=N 2=Y 1

(EXPECTED BY ORIGINATE LINE)

This parameter appears only if the programmed originate port is either E&M or T1. A "1" indicates that "M" lead, answer supervision, is not required in addition to the voicepath check to score a completion. A "2" indicates that answer supervision is required. The check for supervision is made at the end of the confirmation tone check.

1 D-W 00000-0000 (TYP: 00300-0200) (WINK SENT BY TERMINATE PORT)	This parameter appears only if the programmed terminate port is either E&M or T1. This is the first of five possible "delay / wink" parameter entries for this line. The first set of five digits indicate the amount of time, in milliseconds, from seizure on the terminate port to wink or answer. Allowable entries are from 00000 to 99900ms in 100ms steps (actually only the first three digits of the five are programmable from 000 to 999). The second set of four digits indicate the duration of the wink after the above delay. This may be set from 0000 (indicating answer) to 6250 in 50ms steps (actually only the first three digits of the four are programmable from 000 to 625). The delay parameter is normally set to approx 300ms and the wink to 200ms.
2 D-W 00000-0000 (TYP: 05000-0000)	This parameter appears only if a wink entry of anything other than 0000 is entered above. It functions just as the first delay / wink parameter.

NOTE: Multiple delay / winks are used to allow the switch under test, time to outpulse digits such as ANI, called number, etc. If a delay is programmed that is not long enough to allow the switch time to outpulse its digits, invalid test results may occur. This delay is typically set from 3 seconds to 10 seconds to allow either MF or DP digits ample time to be outpulsed by the switch. If the delay setting is not of sufficient duration for the digits to be outpulsed, the switch will probably consider the call to be a failure and not set up the path. This delay setting replaces the 3/10 second switch on the Dual E&M cards. On the other hand, if the wink is not long enough, or too long, the switch will also probably consider the call to be a failure and abort. For these reasons, care should be taken in selecting the timing used. A typical timing diagram is shown below:



3 D-W 00000-0000		Same as the parameter, above.
4 D-W 00000-0000		Same as the parameter, above.
5 D-W 00000-0000		Same as the parameter, above.
TIMEOUT-RNG	10-1	These are actually two parameters. The first is "timeout" and indicates the amount of time, in seconds, that the originate port will wait, from the last digit dialed, until: A) the programmed voicepath confirmation tone is received if unpaired operation is selected, or B) a ring, or equivalent, is detected on the terminate port, if paired operation is selected. On E&M and T1 terminate ports, the switch's seizure of the terminate port is the equivalent to a ring. Allowable entries are from 01 to 50 seconds in one second steps. As a practical matter, this setting should be long enough to always give the switch sufficient time to complete the call, but, not so long that time is being wasted on calls that will never terminate i.e. re-order, busy, high and dry, etc. If "Don't Care" ("D"), is programmed for the originate port tone check, the timeout is ignored. The confirmation is made immediately after outpulsing, and the connection is dropped unless a conversation time, explained later, is programmed. The second parameter on this line is "ring" and controls when the loop, analog terminate port will answer the incoming call. This parameter is ignored on E&M and T1 Terminate ports. Allowable entries are from 1 to 8 rings in one ring steps.
INTERCALL	03	This parameter indicates the amount of time, in seconds, that the originate port will stay on-hook after completing its programmed sequence, before going off-hook and beginning the next sequence. Allowable entries are from 01 to 25 seconds in one second steps.
TT=1 DP=2 MF=3 (DMF=4)	1	This parameter dictates which mode of outpulsing (DTMF, dial pulse, or multi-frequency) will be used by the originate port when beginning its dialling.

NOTE: Digitally generated MF may be selected for any T1 originate port by selecting a digit "4" in this parameter location. THE PROMPT WILL NOT BE DISPLAYED. The frequency offset and amplitude prompt are ignored when "4" is selected. The main reason, or benefit, for selecting digitally generated MF as opposed to analog MF is to speed up the outpulsing rate since all ports may be outpulsing digitally generated MF at

one time and only one port can outpulse and analog generated MF digit at a time. If a "4" is entered and anything other than a T1 originate port is selected, that port will be treated as if "3" (MF) were selected. Allowable entries are 1, 2, 3, or 4.

LO FRE 00 This parameter appears only if tone dialling (TT or MF) is selected. This parameter allows the user to "offset" the tones, in the "low band", from the default center frequencies. Allowable entries are from -35 (meaning offset by a negative 3.5%) to _35 (meaning offset by a positive 3.5%) in .5% steps.

HI FRE 00 Same as above, but for the "high band" frequencies.

LO HI DB 06-06 This parameter only appears if tone dialling is selected. It controls the output level of both the low band and the high band signals, independently. The first two digits control the low band (in db) and the second two digits control the high band. Allowable entries are minus 06-06 to minus 30-30 in 03 (db) steps.

NOTE: LO FRE, HI FRE, LO-HI DB settings do not affect Digital Multi-Frequency (DMF) tone generation. These are fixed at center frequencies and -07db output level.

ON-OFF TIM 60-60 This parameter only appears if tone dialling is selected. This parameter sets the on and off tone duration of the MF , TT or DMF digits. The first two digits set the on time, in milliseconds, and the second two digits set the off, or interdigital, time. Allowable entries are 25-25 to 99-99 in 01ms steps.

NOTE: Except for Digital Multi-Frequency (DMF), the programmed off time will always be the minimum length of interdigital time, however, this time may increase depending upon the load of the tone generator. The greater the quantity of tone dialling lines, the longer the off time. DMF tones will always be output at the selected on-off times.

SPEED-BR 10-60 This parameter appears only if DP dialling is selected. This set of parameters control both the dial pulse speed, in pps, from 05 to 25, and the percent break of the dial pulses from 40 to 80. Allowable entries are indicated above and are adjustable in steps of "1".

ID-DELAY 0600 This parameter appears only if DP dialling is selected. It controls the interdigital timing of the dial pulses and is adjustable from 0150ms to 6000ms in 25ms steps.

CONV TIME	0000	This parameter controls the holding, or conversation, time of each call on this line. In paired operation, there will be a voicepath check at the beginning of this time and another check at the end of the time. Allowable entries are 0000sec, 0006 to 0255sec in one second steps and 0260 to 1275 in five second steps. 1 to 5 seconds of conversation time is not allowed.
START DELAY	000	This parameter is used when operating in the "synchronous" mode to delay the off-hook time for a particular line from when it normally would have gone off-hook until it actually does. It is adjustable in one second steps from 1 to 255. When operating in the "random" mode, it will stagger the initial off-hook only.
FLASH TIME	0500	This parameter controls the length of the hook flash in milliseconds from 0050 to 5000 in 50ms steps.
ATTEMPTS	00000	This is the first of the data registers and is not a programmable parameter. This register reading will contain the number of "attempts" that have been made from this originate port since the line or unit's registers were last "reset". This reading will roll over to 00000 after reaching 65535.
DT DELAYS	00000	This also is a data register keeping count of start dial delays - Dial Tones, Winks, etc. not received within the time set by the DT DELAY parameter. It has the same characteristics as the "attempts" register. This register will not increment if "No Dial Tone" is detected.
NO DT	00000	This data register keeps count of the number of times that start dial is not received within 15 seconds from off-hook.
NO RING	00000	This data register keeps count of the number of times that ringing, or equivalent, is not detected by the terminate port when operating in the paired mode. It will not increment when the line is in the unpaired mode.
NO TONE	00000	This data register will increment whenever the required programmed call confirmation tone is not detected. It will increment only once per attempt, regardless of whether "two way" voicepath or "conversation time" were selected.
COMPLETE	00000	This data register will increment whenever the originate port successfully completes a call. The number of "no dt", "no ring", and "no tone" subtracted from the

		"attempt" will equal "complete". The only exception is if "sup ck" is "yes", in which case the completions register would be reduced by the number of calls that were successfully completed, but lacked answer supervision.
RUN TIME	00000	This register counts the number of minutes from 00000 to 65535 (then roll over to 00000) that this line has been enabled to generate traffic and the unit has been running. It may be reset, along with the data registers, on a per line or unit basis.
TERM ONS	00000	Terminations count: This register will appear if this line is programmed to be "unpaired". It will count the number of seizures on the programmed terminate port. It resets with the other registers mentioned above.

After the last register is displayed for line 01, execution of the "ETR / STP PARAM" (B) button will cause the first parameter to be displayed of line 02.

COMMENT: At any time during the entry or review of parameters if an invalid entry is made, the display will not move to the next parameter, but, rather will blink. Enter the correct entry at this time. If a parameter was entered that you wish to change, depress "Sel Line" and repeatedly depress "Etr Stp Param" until the desired parameter is reached.

D. COPYING PARAMETERS

Parameters may be copied from one line to another specific line or to all lines by executing the "COPY" button. Remember to depress "SHIFT" prior to depressing "COPY". When this is executed, the display will show "COPY 01-01". The first two digits should be set to display the line number <u>from</u> which you wish to copy. The second two digits should be set to the line number <u>to</u> which you wish to copy. Use "99" as the second two digits if you want to copy to all lines.

All parameters shown above will copy with the exception of:

ORIG PORT
TERM PORT
DIALED NUMBER
O-T TONE
START DELAY
All Data Registers & Run Time Register

E. MODE SELECTION

Before the Unit is started the mode of call generation should be selected. The default mode is "Auto Continue" and "Random" call generation. To change either of these settings, it is necessary to change the "Mode". This is done by executing the "MODE" button. The first time this is done, the unit will change into the "Auto Stop-on-Trouble" mode and the question, "SYN=1 RAN=2" question will be displayed. A "1" will cause the Unit to operate in the

Synchronous mode; that is with all originate ports going off-hook simultaneously (unless the Start Delay parameters have been altered). A "2" causes the originate ports to operate independently from one another. Be sure to execute the command, if you change the call generation mode, by depressing the "ETR / STP PARAM" button. If the "MODE" is changed again, it will now be in the "Manual" mode. This allows the user to step through the dialed number one digit at a time by repeatedly executing the "START" button. To return the mode to the auto continue condition, execute the "MODE" button once again.

F. STARTING THE UNIT

To start the Unit (set), execute the "START" button. For each analog port, there is an associated toggle switch which enables that originate port. For T1 ports, there is a set of 30 individual "dip" switches labeled "PORT ENABLE". These function the same as the individual switches on the analog ports; that is that they allow the associated originate port of their respective line to go off-hook and generate traffic. To "stop" a line, turn the associated toggle or dip switch to the "off" position. To "start" a stopped line when the "unit" is running, simply trun "on" the appropriate toggle or dip switch.

NOTE: **Programmed terminate ports will respond if the unit is "running" or in the "finish" mode, even if the port enable switch for that line is off. The port enable switch only relates to the originate port. Also, if the Originate port is an analog port, that analog enable switch must be used rather than the "port enable" switch on the AM1XT-D or AM1T1 unit.**

G. AUDIO MONITOR

Use the included monitor cord to audibly monitor the events of a given line by plugging one end of the cord into the Monitor jack, near the power connection of the "Basic" unit, and the other end into either the originate or terminate "bantum" connection of the analog port that you wish to monitor, or the appropriate T1 span "Audio" jack. If the latter is chosen, the correct T1 time slot, or channel, must be selected for monitoring by setting the thumbwheel switches for that span to the correct number (01-24). Use the "Volume" control knob to adjust the audio level.

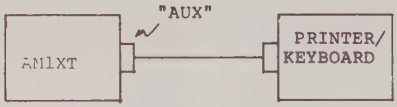
H. USING THE RS232 PORT

If the AM1XT has been equipped with either the 28-0005 or 28-0006 options, a DTE (teleprinter, CRT, Computer, etc.) or modem, or 48-0015 Chaining Cable may be connected to the port for purposes of:

* Requesting / printing reports
* Changing parameter values
* Operating remotely
* Chaining multiple sets together

The AM1XT may be remotely programmed and controlled via the auxiliary ("AUX") port by means of a local or remote printer/keyboard terminal. The printer must be capable of serial asynchronous ASCII operation at 110, 300, 600, or 1200 baud for remote operation or 110, 300, 600, 1200, or 2400 baud for local operation.

For local operation, merely connect the printer/keyboard unit to the "AUX" port on the AM1XT observing the appropriate pin connection as listed below. Set the "configuration" switches located on the RS232/cassette PC board in accordance with instructions on Page 28.



For remote operation, connect the printer/keyboard unit to the "AUX" port on the AM1XT using an appropriate pair of dial up or private line modems observing the appropriate pin connections shown below and "configuration" switch settings as listed on Page 28.

Certain pins on the AM1XT end of the printer cable must be connected together in order to allow proper operation of the AM1XT. In addition, it may be necessary to jumper certain pins on the printer end of the cable in order to allow proper operation of the printer or data terminal. Consult the Instruction Manual of the printer being used.

A suitable cable for connection to <u>most</u> printers, data terminals or modems is illustrated below.

FUNCTION	DB25S PIN #
Transmitted Data	2----Red----> To
Received Data	3----Green--< Printer
Special	5
Special	6
Signal Ground	7----Black---
Special	8
+ Power	9
- Power	10
Special	15
Special	20
Special	22
Special	25

NOTE: **If an AM1XT Unit is used by itself (not chained with other units) and a printer or other output device is <u>not</u> used, then a terminating plug must be plugged into the RS232c port. Failure to use a terminating plug will disable the "synchronous" mode of call origination. The above diagram also depicts such a terminating plug with the exception of wiring on pins 2, 3, and 7.**

NOTE: When requesting or receiving automatic printouts of the data registers, only the first ten lines will be output unless at least one of lines 11-30 are enabled.

1. Real Time Error Reports

In addition to being able to obtain a hard copy of the same data that is visible in the display, additional information is available via the RS232 interface. Real Time Error Reports can be enabled or disabled. These reports are one line outputs which identify failures when they happen. In the area of "No Tone" reports, it further identifies which tone (terminate to originate or originate to terminate) was missing, and whether it was at the beginning of the conversation time or at the end. Real Time Error Reports are enabled by entering Special Function #8 (D, 6, 8, B). They are disabled with Special Function #9 (D, 6, 9, B).

2. Remote Line On/Off Control

In addition to changing parameters, requesting printouts, and performing special functions, the RS232 port can be used to remotely shut off a specific line and cause a specific line to go off-hook and on-hook. The commands from a keyboard to perform these functions are:

COMMAND	FUNCTION
$X	Causes the selected line to go idle
$Y	Causes the selected line to operate under local control, i.e. run if line was enabled and unit is running
$<	Causes the selected line to go off-hook (only if Unit is stopped)
$>	Causes the selected line to go on-hook (only if Unit is stopped)

3. Power Fail Reporting

If power is lost and then regained, an output message will indicate the date and time of both instances.

The next two pages contain some sample printouts.

DATA READOUT 08 00 01/01/85
SUM RUN TIME 00000

LINE	ATT	DTDLY	NODT	NORNG	NOTON	COMPL	RTIME
01	00000	00000	00000	00000	00000	00000	00000
02	00000	00000	00000	00000	00000	00000	00000
03	00000	00000	00000	00000	00000	00000	00000
04	00000	00000	00000	00000	00000	00000	00000
05	00000	00000	00000	00000	00000	00000	00000
06	00000	00000	00000	00000	00000	00000	00000
07	00000	00000	00000	00000	00000	00000	00000
08	00000	00000	00000	00000	00000	00000	00000
09	00000	00000	00000	00000	00000	00000	00000
10	00000	00000	00000	00000	00000	00000	00000
TOTL	000000	000000	000000	000000	000000	000000	

CALL TERMINATION REGISTERS
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
TOTAL 000000

HOURLY DATA READOUT OF A SINGLE AM1XT

UNIT A
DATA READOUT 08 00 01/01/85
SUM RUN TIME 00000

LINE	ATT	DTDLY	NODT	NORNG	NOTON	COMPL	RTIME
01	00000	00000	00000	00000	00000	00000	00000
02	00000	00000	00000	00000	00000	00000	00000
03	00000	00000	00000	00000	00000	00000	00000
04	00000	00000	00000	00000	00000	00000	00000
05	00000	00000	00000	00000	00000	00000	00000
06	00000	00000	00000	00000	00000	00000	00000
07	00000	00000	00000	00000	00000	00000	00000
08	00000	00000	00000	00000	00000	00000	00000
09	00000	00000	00000	00000	00000	00000	00000
10	00000	00000	00000	00000	00000	00000	00000
11	00000	00000	00000	00000	00000	00000	00000
12	00000	00000	00000	00000	00000	00000	00000
13	00000	00000	00000	00000	00000	00000	00000
14	00000	00000	00000	00000	00000	00000	00000
15	00000	00000	00000	00000	00000	00000	00000
16	00000	00000	00000	00000	00000	00000	00000
17	00000	00000	00000	00000	00000	00000	00000
18	00000	00000	00000	00000	00000	00000	00000
19	00000	00000	00000	00000	00000	00000	00000
20	00000	00000	00000	00000	00000	00000	00000
21	00000	00000	00000	00000	00000	00000	00000
22	00000	00000	00000	00000	00000	00000	00000
23	00000	00000	00000	00000	00000	00000	00000
24	00000	00000	00000	00000	00000	00000	00000
25	00000	00000	00000	00000	00000	00000	00000
26	00000	00000	00000	00000	00000	00000	00000
27	00000	00000	00000	00000	00000	00000	00000
28	00000	00000	00000	00000	00000	00000	00000
29	00000	00000	00000	00000	00000	00000	00000
30	00000	00000	00000	00000	00000	00000	00000
TOTL	000000	000000	000000	000000	000000	000000	

CALL TERMINATION REGISTERS
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
TOTAL: 000000

UNIT B
DATA READOUT 08.01 01/01/85
SUM RUN TIME 00000

LINE	ATT	DTDLY	NODT	NORNG	NOTON	COMPL	RTIME
01	00000	00000	00000	00000	00000	00000	00000
02	00000	00000	00000	00000	00000	00000	00000
03	00000	00000	00000	00000	00000	00000	00000
04	00000	00000	00000	00000	00000	00000	00000
05	00000	00000	00000	00000	00000	00000	00000
06	00000	00000	00000	00000	00000	00000	00000
07	00000	00000	00000	00000	00000	00000	00000
08	00000	00000	00000	00000	00000	00000	00000
09	00000	00000	00000	00000	00000	00000	00000
10	00000	00000	00000	00000	00000	00000	00000
TOTL	000000	000000	000000	000000	000000	000000	

CALL TERMINATION REGISTERS
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
TOTAL 000000

HOURLY DATA READOUT OF TWO CHAINED AM1XT UNITS

THE FIRST UNIT (UNIT A) HAS AN EXPANSION UNIT (AM1EXT) ATTACHED

```
LINE A01 NO TONE          @ 08:05 01/01/85
LINE B05 NO RING          @ 08:05 01/01/85
LINE A30 NO DIAL TONE     @ 08:05 01/01/85
```

REAL TIME ERROR REPORTS

```
PARAMETER READOUT 08:02 01/01/85
STOPPED
RANDOM MODE
AUTO CONTINUE
ERROR REPORTS ENABLED
AUTOMATIC DATA READOUT ENABLED
LINE          01
  8189155441
  DT DELAY      03
  PR=1 UNPR=2    1
  CONF TONE     12
  TIMEOUT-RNG 10:1
  INTERCALL     03
  TT=1 DP=2 MF=3 1
  LO FRE        00
  HI FRE        00
  LO HI DB   :06:06
  ON-OFF TIM 60:60
  CONV TIME   0000
  START DELAY  000
  FLASH TIME  0500

DATA READOUT 08:03 01/01/85
CUM RUN TIME:  00000
LINE   ATT   DTDLY   NODT  NORNG  NOTON  COMPL  RTIME
 01   00000  00000  00000  00000  00000  00000  00000


TERMINATIONS:  00000
```

PARAMETER READOUT FOR ONE LINE OF AN ANALOG UNIT

```
UNIT: A
PARAMETER READOUT 08:06 01/01/85
STOPPED
RANDOM MODE
AUTO CONTINUE
ERROR REPORTS ENABLED
AUTOMATIC DATA READOUT ENABLED
LINE          01
  ORIG PORT   A:01
  TERM PORT   A:01
TEL #:
  8189155441
  DT DELAY      03
  PR=1 UNPR=2    2
  O-T TONE     0:D
  TIMEOUT-RNG 10:1
  INTERCALL     03
  TT=1 DP=2 MF=3 1
  LO FRE        00
  HI FRE        00
  LO HI DB   :06:06
  ON-OFF TIM 60:60
  CONV TIME   0000
  START DELAY  000
  FLASH TIME  0500

UNIT: A
DATA READOUT 08:06 01/01/85
CUM RUN TIME:  00000
LINE   ATT   DTDLY   NODT  NORNG  NOTON  COMPL  RTIME
 01   00000  00000  00000  00000  00000  00000  00000


TERMINATIONS:  00000
```

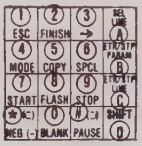
PARAMETER READOUT FOR ONE LINE OF A DIGITAL UNIT

REMOTE OPERATION

Remote programming of the AM1XT may be accomplished manually or may be performed by using a computer to "download" parameters into the AM1XT. The two cases are discussed separately.

Manual Remote Loading of Parameters

The keyboard of the teleprinter is used in much the same way as the keyboard of the AM1XT Basic Unit. For this reason, the user should become very familiar with the local keypad/display operation before attempting remote operation. Sixteen teleprinter keys are used which directly relate to the sixteen keys on the AM1XT local keypad. The figure below shows an AM1XT keypad and highlights the equivalent teleprinter keys used for remote control.



Entry of parameters and control commands use the same keystrokes as if the local AM1XT keypad were being used. "Prompts" are output to the printer in the same manner as the "prompts" are displayed on the 16 character display on the AM1XT front panel. Once these principles are understood the AM1XT can be controlled remotely just as easily as locally.

A sample dialogue between an operator and the AM1XT follows. Characters input by the operator are underlined. The ; character is output to mark the beginning of a parameter field. Once a parameter field has been filled, the ; will again be output. Any parameter character not entered will remain unchanged.

DIALOGUE		COMMENTS
A		
LINE	01;05;B	Line 05 selected
ORIG PORT	a01;b09;B	T1 span "B", channel "9" selected
TERM PORT	a01;d14;B	T1 span "D", channel "14" selected
	;9630334B	Telephone number 9630334 entered
DT DELAY	03;05;B	Dial tone delay threshold changed to 5 sec
PR=1 UNPR=2	1;B	Paired operation selected
CONF TONE	12;B	Confirming tone "1", bothway voicepath
SUP CH 1=N 2=Y	1;B	No supervision check required
1 D-W 00000-0000;	B	Answer when terminate port is seized
TIMEOUT-RNG	10;15;B	Call failure timeout changed to 15 sec
INTERCALL	03;08;B	Intercall time changed to 08 seconds
TT=1 DP=2 MF=3	1;B	TT dialling
LO FRE	00;D*25;B	(D* enters "-") Low freq offset by -2.5%
HI FRE	00;D010;B	High Freq offset by +10% (D0= blank).
LO HI DB	:06:06;12:18;B	Low freq outpulsed at -12 DB; High freq at -18DB.
ON-OFF TIME	60:60;40:50;C	ON/OFF timing changed to 40ms ON, 50ms OFF.
LINE	06;	Parameter entered and stepped to same parameter of next line.
ON-OFF TIME	60:60;	ON/OFF time for line 06 is now displayed.

NOTE: The underlined characters were keystrokes entered by the operator and echoed by the AM1XT (the letters "A", "B", "C", and "D" are not echoed). All other characters are output by the AM1XT directly. Upper case "A" is the same as "SEL LINE". Upper case "B" is the same as "ETR / STP PARAM". Upper case "C" is the same as "ETR / STP LINE". Upper case "D" is the same as "SHIFT".

As a convenience, some characters that normally require two keystrokes may be directly entered from the teleprinter keyboard. A listing of these characters follows:

KEYPAD FUNCTION	TELEPRINTER CHARACTER
NEG (-)	-
BLANK	(Space Bar)
PAUSE	P
FLASH	F
A	a
B	b
C	c
D	d
E (Escape)	E

All other keypad functions are also available. The sequence "D7" will cause the AM1 to begin making calls. The word "Start" will be printed as an acknowledgement. "D9" will cause the unit to stop. The "MODE," "COPY", and "SPCL" commands all work remotely, again using the same keystrokes as for local operation.

2. Computer "downloading" of Parameters

Computer loading of parameters is very similar to manual loading of parameters. Please study the section on manual operation before reading this section. Computer operation is initiated by the character "(". After "(" has been received, the AM1XT will no longer issue "prompts". Instead, it will simply echo the received character. The character ")" will cause the AM1XT to resume manual operation with full prompting. **Computer downloading should not be attempted at 2400 baud.**

Upon receipt of a "B" (Step Parameter) or "C" (Step Line) command, the AM1XT will evaluate the parameter just entered. If the parameter is valid, the "B" or "C" will be echoed. If the parameter is invalid, the AM1XT will echo a "?" and expect the parameter to be re-entered correctly.

This scheme allows the computer to use as little or as much error checking as desired. It is possible to dump a string of characters into the AM1XT without regard to the characters being sent back by the AM1XT. Error checking may be implemented by comparing each echoed character with the character just sent.

When using a computer to enter parameters, be sure to require your program to receive the "echoed" character before continuing with the next character. This will prevent sending characters to the AM1XT faster than it can accept them.

J. CHAINING MULTIPLE AM1XT SYSTEMS

Any AM1XT basic unit, with or without an expansion unit or T1 adaptor unit, may be "chained" to other AM1XT basic units by means of a model 48-0015 chaining cable. Up to 15 sets may be chained together for to achieve a system capacity of 450 originate and 450 terminate ports. There are two advantages gained by chaining multiple units as compared to operating the same number of multiple units as stand-alone.

a. The chained units can share a common printer and/or be remote controlled by a single remote terminal.

b. When operating in "Synchronous" call originate mode, all units are synchronized together and will simultaneously initiate calls (go off-hook).

1. Connection

The following prerequisites are necessary in order to allow chaining of multiple units.

a. Each AM1XT must be equipped with the Optional 28-0006 RS232c Interface or 28-0005 RS232c/Cassette Interface and all interfaces must be set for the same transmission speed, parity selection, etc...

b. Each AM1XT in the chain (except for the first unit in the chain) must be equipped with the Optional 48-0015 Chaining Cable.

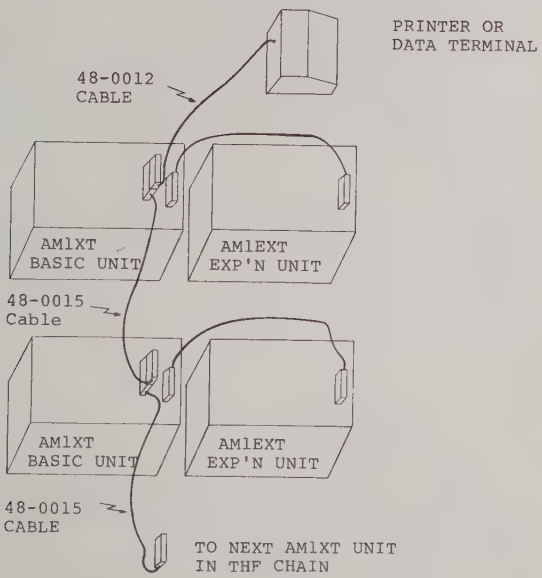
Units are connected together by means of their RS232c ports using the 48-0015 Chaining Cable.

The 48-0015 Chaining Cable contains a female DB25 at one end and a "TEE" arrangement at the other end consisting of back to back DB25 connectors, one female and one male.

Units are chained together beginning with the last unit in the chain and working toward the beginning of the chain. The single connector end of the 48-0015 cable is plugged into the last unit RS232c port and the "TEE" end of the cable is plugged into the next higher unit in the chain. That unit is then connected to the next higher unit in the chain using another 48-0015 cable and so on and so on.

The printer or remote terminal (if used) is then plugged into the "TEE" on the first unit in the chain.

The connection of units is illustrated below:



Note that it is the AM1XT basic units which are chained together and that the AM1EXT Expansion units are connected to their respective host AM1XT units in the same way as they would be for stand-alone operation.

IMPORTANT

Because of novel software each AM1XT Unit in the chain automatically recognizes its position in the chain and assumes a proper address depending upon its position in the chain.

The address of each AM1XT/AM1EXT set in the chain is a single alpha-numeric character:

The first unit	(AM1XT/AM1EXT)	is "A"
The second unit	"	is "B"
The third unit	"	is "C" continuing to
The fifteenth unit	"	which is "O"

The "address" character is important for several reasons:

a. Any automatic data readout will contain the unit ID character in the header of the readout to indicate which unit in the chain the data readout came from.

b. When controlling a chain of units from a terminal attached to the first unit in the chain, it is necessary to "address" a specific unit in the chain by sending its address character before sending it commands. NOTE: It is also possible to send certain "global" commands to all units in the chain by first sending the global address character "Z".

2. Local Printout with Read Only Printer

When units are arranged in a chain and used without an output device (printer) or when they are used with a read only printer, each AM1XT/AM1EXT Unit is controlled from its own front panel keyboard display. There is no interaction between units as each unit will respond only to its own keyboard commands and will not affect other units in the chain.

There are only two functions which cause interaction between units. These are "Synchronous Mode" call generation and "Automatic" data readouts.

a. Synchronous Operation

One or more of the AM1XT units in a chain may be set for "Synchronous Mode" of call origination. All units operating in synchronous mode must be "started" (running) or none will originate calls. Conversely, if all "synchronized" units are "running" and any one of them is "stopped", the remaining units will finish any calls in progress and then they will not originate any further calls until the "stopped" unit is "started" again. The purpose of this mode is to provide a large quantity of originate lines generating "simultaneous off-hook" calls.

If desired, some or all of the units in a chain may be running in "random" call originate mode while other units in the chain are running in "synchronous" mode. Units "running" in "random" mode will originate calls randomly without regard to any other units generating calls synchronously.

While any or all units are "running" in "synchronous" or "random" mode any specific line may be temporarily disabled (stopped from placing calls) by moving the line's front panel toggle to "Off" position. That line will resume calling (provided the unit is still "running") when its toggle switch is moved from its off position.

b. Automatic Data Readout

All units in a chain will sequentially output an Automatic data printout each hour, on the hour. The calendar time clock in the first unit of the chain (Unit "A") will control the printout.

Each hour the first unit in the chain will output a "Header" identifying itself as "Unit A" followed by 10 lines of data (30 lines if an AM1EXT Expansion Unit is connected to an AM1XT Basic Unit). The first unit then automatically signals the second unit to begin its printout and so forth until (in domino fashion) all units have completed their printouts.

If any "Real Time Error Messages" are originated during the data printout they will be automatically held back (buffered) until the automatic readout is completed. Following the automatic readout, any buffered Error Messages will be output.

3. Remote Control

Remote control of a chain of AM1XT units may be accomplished from a keyboard/printer, a keyboard/CRT, or any other send receive device capable of sending/receiving a serial ASCII data stream connected to the RS232c port of the first AM1XT unit of the chain.

The send/receive terminal may be connected directly to the first AM1XT unit RS232c port or may be remotely connected to this port by means of modems.

a. Operation (of a specific unit)

Because all AM1XT units in the "chain" are effectively connected together on a "party" line, it is necessary to first "address" the desired unit before "commands" are sent to it.

This is accomplished by sending the ASCII character "!" (shift, 1) followed by the address "letter" (A, B, C, etc.) associated with the desired unit in the chain. For example: "!B" will cause the second unit ("B" unit) in the chain to respond to all subsequent commands.

To address a different unit in the chain, merely send "!" followed by that unit's "letter". Whenever the address is sent (for example: "!A") the unit will echo the command.

When in doubt as to which unit was last addressed, merely re-send the "!" character followed by the desired unit's address "letter".

Once a unit has been "addressed" it may be controlled in accordance with the Using the RS232 Port section of this Instruction Manual (Section III-E).

b. Global Operation of Chained Units

There are certain commands which may be simultaneously sent to all units in the chain. These are called "Global Commands".

Before sending a "Global Command" it is first necessary to send a special address which causes all units in the chain respond to subsequent (global) commands. This is accomplished by sending "!" (shift, 1) followed by the letter "Z".

The chain will echo back the characters "!Z" as they are entered.

The allowed "Global Commands" are:

Command	Functions
D7	Start (causes units to begin calling)
D9	Stop (causes units cease calling)
D2	Finish (gradual stop)
D64B	Reset All Registers (resets all data registers to zero)
D68B	Enable Real-Time Exception Reporting
D69B	Disable Real-Time Exception Reporting
D5xxyyB	Copy from Line xx to Line yy
D5xx99B	Copy from Line xx to All Other Lines
ctrl B	Cause Data Printout from All Lines (Chained units only)
ctrl @	Interrupt (Stop) Data Printout (Chained units only)
D4	Change Mode
D41B	Change Mode and Select "Synchronous" Operation
D42B	Change Mode and Select "Random" Operation

c. Automatic Operation

The first unit in the chain will initiate an "automatic" data readout from all units in the chain once each hour. Each unit in the chain generates its own header identifying itself (Unit A, Unit B, etc) and each unit (AM1XT) will output either 10

lines of data if operating without its AM1E Expansion Unit or 30 lines of data if operating with its AM1E Expansion Unit. The register content of successive data readouts are cumulative. That is, the data registers are not reset after each printout.

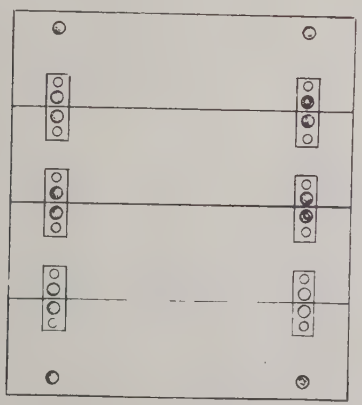
Any "Real-time Exception" messages which occur during a data readout will automatically be held back (buffered) until after the data readout at which time they will be allowed to output.

K. CASSETTE RECORDER OPERATION

Option 28-0005 provides for compatibility to Model 24-0002 Cassette Recorder. This provides the user to "can" multiple call scenarios of unique call parameters for rapid loading into the AM1XT. The command, D, 6, 7, B will cause the AM1XT to dump its parameter memory to tape. The command, D, 6, 6, B will cause the AM1XT to read into its memory, from tape, the parameters.

L. STACKING OF UNITS

In addition to the units being able to be electrically "chained", the units may also be "stacked". This is accomplished by using the metal brackets on the bottom of the portable AM1XT carrying case. These brackets may be moved to the positions shown below by unscrewing the rubber feet, shifting the position of the brackets, and replacing the rubber feet in the appropriate location.



IV TECHNICAL SPECIFICATIONS

GENERAL

DESCRIPTION: Multiple port, programmable, telephone call generator/call terminator with coincident recording of attempts, dial tone delays, no dial tones, no rings, no confirmation tones, and completions data.

CONSTRUCTION: Modular, plug-in printed circuit boards in rugged portable carrying case.

TECHNOLOGY: Microprocessor based (Z80), solid state.

DIMENSIONS & WEIGHT:

Unit	Dimensions	Net Wt.	Shipping
Portable			
AM1XT	16.8Lx7.2Wx11.5H	16 lb	23 lb
AM1EXT	16.8Lx7.2Wx11.5H	17 lb	25 lb
AM1T1	16.8Lx7.2Wx11.5H	16 lb	23 lb
Rack Mount			
AM1XT	19Lx5.25Wx10D	11 lb	18 lb
AM1EXT	19Lx5.25Wx10D	12 lb	20 lb
AM1T1	19Lx5.25Wx10D	11 lb	18 lb

CAPACITY: From 1 to 30 originate and terminate ports (maximum capacity 450 originate and 450 terminate ports when chaining multiple sets).

FUSING: AM1XT & AM1T1: 110VAC-3A
230VAC-1 1/2A
-48VDC-2A

AM1EXT-2 &-3: -48VDC-2A

POWER: 115VAC 50/60 HZ, Optional 230VAC 50/60 HZ, or -48VDC

ELECTRICAL

ORIGINATE PORTS----------

TYPE: Loop start, ground start, 2 and 4 wire E&M, and T1 (DS1 1.544Mbps, 24 Channel, D3/D4 format, DSX1 levels).

CALLED NUMBER: Up to 48 digits (0 to 9 plus *, #, A, B, C, D, KP, ST) "PAUSE" for 2nd, 3rd, etc... dial tone and wink, "WAIT," Switch Hook "FLASH," and "ESCAPE," individually programmable by line.

IMPEDANCE: 900 ohms AC (1200 ohms DC loop resistance simulated) or 600 ohms AC (600 ohms DC loop resistance simulated).

SIGNALING: Dial pulse, (both analog and digitally generated) multi-frequency (MF) , and dual tone multi-frequency (touch tone), individually programmable by line with toggle capability.

TERMINATE LINES----------

TYPE: Two wire (T&R), 2 and 4 wire E&M, and T1

INCOMING CALL DETECT: Senses ringing (or equivalent) energy and trips ringing (shorts loop with 1200 ohms DC, 600 ohms optionally, impedance for loop ports). E&M and T1 ports begin programmed wink/delay sequence before answering.

CONFIRMING TONES: (PAIRED OPERATION) Any of the following frequencies, programable by line: 1633HZ, 1477HZ, 1366HZ, 1209HZ, 941HZ, 852HZ, 770HZ, 697HZ. Voicepath confirmation may be one way or two way. Unit sends confirming tones at the beginning and at the end of the simulated conversation time interval.

CONFIRMING TONES: (UNPAIRED OPERATION) Any of the following frequencies, programmable by line: 1000HZ, 1025HZ, 1150HZ, 1275HZ, 1400HZ, 1525HZ, 1650HZ, 1775HZ, 1900HZ, 2025HZ, 2150HZ, 2275HZ, 2400HZ, 900HZ, QUIET. In unpaired operation, both the tone expected by the originate port and the tone sent by the terminate port are programmable. If the terminate port is a T1 port, any of the above tones may be selected for output. The tone will be constantly sent from terminate port off-hook until on-hook, including conversation time, if any. Only far-to-near, or one way voicepath check can be made in the unpaired mode. If the terminate port is analog, only the "quiet" selection may be made.

T1 PORTS: DS1, 1.544Mbps, 24 Channel, D3/D4 format, DSX1 levels.

RINGER EQUIVALENCE: 1 R.E.N.

DATA COLLECTION

REGISTERS: There are six data collection registers for each line. They are:

Attempts: Increments each time the originate port goes off hook and test is completed.

Dial Tone Delay: Increments if first or subsequent start dials are not received within the pre-set dial tone delay threshold.

No Dial Tone: Number of times that the originate port attempted a call wherein start dial was not received within 15 seconds.

No Ring: Number of times that a call attempt obtained dial tone, dialed its pre-programmed number but ringing, or equivalent, was not detected on terminate port in paired mode.

No Tone: Number of times that a call progressed to completion but the expected Confirming Tone (one way or both ways as selected) was not received.

Completions: Increments if expected confirming tone(s) is received following call completion.

One additional "RUN TIME" register for the unit indicates overall accumulated run time in minutes. One run time register per line indicates accumulated run time for each line.

In addition to the above, there is an additional register which counts the number of "Terminations" for unpaired Terminate port lines.

REGISTER CAPACITY: Each register will accumulate counts to 65535 and will then wrap around to zero and begin counting again. Registers reset by "power up" or "special function" keyboard command.

DATA DISPLAY: Self prompting LED 16 digit alpha numeric display used to enter/display "programmable parameters" and "data register" contents.

PRINTER OUTPUT: Optional RS232c interface available for I/O connection to Standard ASCII printer. Baud rate is switch selectable from 110-2400 Baud.

PRINT INTERVAL: Automatic, nondestructive, cumulative data register printout on the hour, each hour.

CASSETTE RECORDER: Optional RS232 and audio cassette interface available to allow for writing call parameters to and reading from tape.

PROGRAMMABLE PARAMETERS: Each parameter individually programmable by line.

PARAMETER	MINIMUM SETTING	DEFAULT SETTING	MAXIMUM SETTING	GRANULARITY
Orig Port		A (line #)		
Term Port		A (line #)		
Telephone Number	Up to 48 digits. Allowable digits are 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, *, #, A, B, C, D, KP, ST. PAUSE for second (or third, etc.) dial tone or wink, WAIT, FLASH, ESCAPE. **When outpulsing MF or DMF (Digital MF), KP is entered as the * and ST is entered as the #. The KP signal tone "on" time will be twice the programmed "on" time for that line.**			
Delay before Incrementing Dial Tone Delay Counter	1 Sec	3 Sec	15 Sec	1 Sec

PARAMETER	MINIMUM SETTING	DEFAULT SETTING	MAXIMUM SETTING	GRANULARITY
Paired or unpaired oprn.	1 = PR 2 = UNPR	1	-	-
Expected Termination Confirmation Tone Frequency (first digit) & Direction (second digit)	-	697HZ 2 Way (12) 1 = one way 2 = two way Frequency	-	1=697HZ 2=770HZ 3=852HZ 4=941HZ 5=1209HZ 6=1336HZ 7=1477HZ 8=1633HZ
Originate/ Terminate Tone	-	0-D	0=1025HZ, 2=1275HZ, 4=1525HZ, 6=1775HZ, 8=2025HZ, A=2275HZ, C=900HZ,	1=1150HZ 3=1400HZ 5=1650HZ 7=1900HZ 9=2150HZ B=2400HZ D=QUIET (DON'T CARE)
E&M/T1 Supv check	1 = NO 2 = YES	1	-	-
Delay-Wink Timing (1 to 5 times)	0ms D 0ms W	0ms D 0ms W	99900ms D 6250ms W	100ms D 50ms W

NOTE: Even though the Winks may be set as short as 50ms, the minimum duration should be 150ms. Delay "1" minimum setting should be 300ms. All Delays are spec'd at ±100ms and Winks are ±50ms.

Wait for Termination (paired) or Confirmation Tone (unpaired) before Abandoning Call/Rings before Answer	1 Sec 1 Ring	10 Sec 1 Ring	50 Sec 8 Rings	1 Sec 1 Ring
Intercall Interval	1 Sec	3 Sec	25 Sec	1 Sec
Signalling Selection	TT = 1 DP = 2 MF = 3 DMF= 4*	1	-	-
Dial Pulse Rate (Speed)	5 pps	10 pps	25 pps	1 pps
% Break	40%	60%	80%	1%
Interdigit Pause	150ms	600ms	6000ms	100ms
Hi Frequency Offset	-3.5%	0% **	+3.5%	.5%

PARAMETER	MINIMUM SETTING	DEFAULT SETTING	MAXIMUM SETTING	GRANULARITY
Lo Frequency Offset	-3.5%	0% **	+3.5%	.5%
Hi Frequency Amplitude	-30dbm	-6dbm	-6dbm	3db
Lo Frequency Amplitude	-30dbm	-6dbm	-6dbm	3db
Duration On	25 ms	60 ms	99 ms	1 ms
Duration Off***	25 ms	60 ms	99 ms	1 ms
Conversation Time	0 Sec **** 260 Sec	0 Sec	255 Sec 1275 Sec	1 Sec 5 Sec
Start Delay	0 Sec	0 Sec	255 Sec	1 Sec
Flash Time	50 ms	500 ms	5000ms	50 ms
Operating Mode	Auto-Continue Auto-Stop on Tbl Manual		-	-
Call Initiation Selection	SYN = 1 RAN = 2	2	-	-

*Digitally Generated Multi-Frequency "DMF=4" prompt is not displayed and only applies to T1 originate ports. The HI and LO frequency offset and amplitude parameters are ignored, although may be altered as normal when "DMF" is used.

**DTMF Frequencies =

Hi Band	Lo Band	**MF Frequencies
1633HZ	941HZ	700, 900, 1100,
1477	852	1300, 1500, 1700
1336	770	LO Frequencies = The "Lower" of the 2 frequencies used to construct a digit.
1209	697	HI Frequencies = The "Higher" of the 2 frequencies used to construct a digit.

*** The off time will always be at least the programmed "off" time. This duration will be extended, randomly, due to the tone generator being shared among all lines.

**** 1-5 Seconds not allowed

Hi Band Frequencies (HZ)

1209	1336	1477	1633	
1	2	3	A	697
4	5	6	B	770
7	8	9	C	852
*	0	#	D	941

DIGITS

	Digit	Lo Fre	Hi Fre
Lo Band Frequencies (HZ)	1	700	900
	2	700	1100
	3	900	1100
	4	700	1300
	5	900	1300
	6	1100	1300
	7	700	1500
	8	900	1500
	9	1100	1500
	0	1300	1500
	*(KP)	1100	1700
	#(ST)	1500	1700
(ST3P)	A	700	1700
(STP)	B	900	1700
(ST2P)	C	1300	1700

V TROUBLE SHOOTING GUIDE

	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1.	Unit won't turn on.	No input power source.	Verify that proper power is applied.
		Fuse blown.	Remove front panel and check fuse on power supply module.
2.	None of the Lines start	Unit not running.	Execute "START" command.
		None of the line enable switches are on.	Verify that the line or port enable switches are enabled
3.	Selected lines don't start	That line's enable switch is off.	Turn on that line's enable switch.
4.	Completion registers don't increment	Calls are not completing to the correct port	Verify that the dialed number as programmed is the correct number of the terminate port, if paired operation is selected. Verify the O-T tone param. if unpaired to be sure that the originate line is expecting the correct frequency.
		Supervision check parameter is enabled and not received.	Verify status of "Sup Ck" parameter and whether or not answer supervision is being received (for E&M or T1 ports only).
5.	Automatic printout (or cassette dump) doesn't include lines 11-30.	None of the port or line enable switches for those lines are enabled.	Enable at least one of the switches for lines 11 - 30.
6.	Synchronous mode doesn't start	RS232 port connector not strapped correctly.	Verify that RS232 port is equipped with 48-0012 or 48-0015 cable or that strapping meets requirements as stated in this manual.
7.	Printer doesn't work	Wrong baud rate setting	Check switch setting on RS232 board and on printer.

VI ORDERING INFORMATION

MODEL	QUANTITY	DESCRIPTION
BASIC UNITS ANALOG		
AM1XT-1 _ _*	_____	Extended Feature Bulk Call Generator Basic Unit equipped with 10 originate (loop or ground start) and 10 terminate (loop) ports. Unit supports AM1T1-1 unit and/or AM1E Expansion Unit. Available in 115VAC, 220VAC, and -48VDC power configurations.
AM1XT-2 _ _*	_ __	Same as AM1XT-1, but, with 10 originate (2 or 4 wire E&M) and 10 terminate (2 or 4 wire E&M) ports.
BASIC UNIT DIGITAL		
AM1XT-D _ _*	_____	Extended Feature Bulk Call Generator Basic Unit equipped for up to three T1 PCM Span Lines. Unit supports AM1E Expansion Unit. Available in 115VAC, 220VAC, and -48VDC power config.
ADAPTOR UNITS		
AM1T1-1 _ _*	_____	Single T1 Tri-Span Digital adaptor unit for use with one AM1XT (-1XX or -2XX) unit. Available in 115VAC, 220VAC, and -48VDC power configurations. Includes cable for connection to AM1XT.
AM1T1-2 _ _*	__	Dual T1 Tri-Span Digital adaptor unit for use with two AM1XT (-1XX or -2XX) units. Available in 115VAC, 220VAC, and -48VDC power configurations. Includes cable for connection to AM1XT.

*** COMPLETE AM1XT MODEL NUMBER USING KEY SHOWN BELOW:**

_ _ **1 = Portable; 2 = Rack Mount**
1 = 115VAC; 2 = 220VAC; 3 = -48VDC

Example: AM1XT (loop) equipped for -48VDC & portable operation is model number: AM1XT-131

EXPANSION UNITS		
AM1EXT-1 _*	___	Expansion Unit, equipped with 20 originate (loop or ground start) and 20 terminate (loop) ports. Includes expansion cable for connection to AM1XT.
AM1EXT-2 _*	_ ___	Expansion Unit, equipped with 20 originate (2 or 4 wire E&M) and 20 terminate (loop) ports. Includes expansion cable for connection to AM1XT.
AM1EXT-3 _*	_____	Expansion Unit, equipped with 8 originate (2 or 4 wire E&M) and 12 originate (loop or ground start) and 20 terminate (loop) ports. Includes expansion cable for connection to AM1XT.

AM1EXT-4 _* _____ Expansion Unit, equipped with 20 orig. (2 or 4 wire E&M) and 20 term. (2 or 4 wire E&M) ports. Includes expansion cable for connection to AM1XT.

* COMPLETE AM1EXT MODEL NUMBER USING KEY SHOWN BELOW:
_ 1 = Portable; 2 = Rack Mount

OPTIONS

28-0006 _____ RS232c Interface. Used for interfacing AM1XT to printer, CRT, modem, etc.

28-0005 _____ RS232c and Cassette Interface. Same as 28-0006 (above), Plus interfaces to 24-0002 Cassette Rec.

ACCESSORIES

24-0011 _____ Portable Printer (includes cable and one roll of paper). Requires Option 28-0005 or 28-0006.

24-0002 _____ Cassette Recorder (includes cable and one cassette). Requires Option 28-0005. Used for storage and rapid loading of unique call parameters.

26-0011 _____ Printer Paper (roll)

26-0001 _____ Cassette (each)

87-0002 _____ Transit Case. Rugged, custom transport container for two AM1XT type units.

48-0012 _____ Universal RS232c Port Cable

48-0015 _____ Chaining Cable. Used to "stack" multiple Basic/Expansion units up to 15 pairs. Requires Option 28-0005 or 28-0006 for each AM1XT unit.

88-0001 _____ Replacement Battery for CPU/MEMORY/RTC board (P/N 280033)

CONNECTING CABLES

FOR LOOP ORIGINATE / LOOP TERMINATE PORTS

48-0004 _____ Dual Line Cable (spade lug end), 10'

48-0005 _____ Dual Line Cable (minigator end), 10'

48-0006 _____ Dual Line Cable (sleeve end), 10'

FOR E&M ORIGINATE / LOOP TERMINATE PORTS

48-0020 _____ Dual Line Cable (open end), 10'

48-0021 _____ Dual Line Cable (minigator end), 10'

48-0022 _____ Dual Line Cable (sleeve end), 10'

FOR E&M ORIGINATE / E&M TERMINATE PORTS

48-0039 _____ Dual Line Cable (open end), 10'

48-0040 _____ Dual Line Cable (minigator end), 10'

48-0041 _____ Dual Line Cable (sleeve end), 10'

FOR DIGITAL T1 PORTS

48-0047 _____ Bantum to Bantum, 6', Patch Cord Two required for each T1 Port

48-0048 _____ Bantum to 310 Plug, 6', Patch Cord Two required for each T1 Port

PANEL MOUNT ADAPTOR FOR AM1XT-1 & AM1EXT-1 ONLY

48-0018 _____ 50 Pin, female, AMP type connection Adaptor, (one required per AM1XT-1; two required per AM1EXT-1)

ADAPTOR FOR RACK MOUNT AM1EXT-2 ONLY

36-0002 _____ 50 Pin, female, AMP type connection panel, (three connectors) 20 orig / 20 term ports

ADAPTOR FOR RACK MOUNT AM1XT-2 & AM1EXT-4 ONLY

36-0003 _____ 64 Pin, female, AMP type connection panel, (two connectors) 10 orig / 10 term ports

36-0004 _____ 64 Pin, female, AMP type connection panel, (four connectors) 20 orig / 20 term ports

VII WARRANTY AND SERVICE POLICY

WARRANTY

Ameritec Corp warrants that its electronic instrument products are manufactured to the highest commercial standards and are free of any defects in material or workmanship. For a period of one year from shipment, Ameritec will repair without charge to the original purchaser any unit which upon inspection by Ameritec proves to be defective. This warranty is the sole warranty offered by Ameritec and is in lieu of all other warranties expressed or implied and all other obligations or liabilities including claims of consequential damage.

SERVICE POLICY

In the event of malfunction, call or write the Ameritec factory and obtain return authorization. Return the unit to Ameritec freight prepaid with a note enclosed listing:

*Return authorization number
*Return shipment address
*Name and telephone number of person familiar with the problem
*Brief description of problem

The unit will be repaired and returned freight prepaid.

SERVICE PHILOSOPHY

Ameritec products are designed utilizing modular plug-in printed circuit board construction. Service is accomplished by PC Board replacement and can normally be accomplished in 5 minutes or less.

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